In the United States Court of Federal Claims

No. 98-894C
(Filed June 10, 2005)

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SHORT BROTHERS, PLC,	*	Contracts; breach of contract; illegal
	*	contract; commercial impracticability;
Plaintiff,	*	impossibility; superior knowledge;
	*	mutual mistake; defective government-
v.	*	furnished property; duties of good faith
	*	and fair dealing; unjust enrichment.
THE UNITED STATES,	*	
	*	
Defendant.	*	
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Ronald S. Perlman, Washington, DC, for plaintiff. John H. Korns, Susan Warshaw Ebner, and Brian J. McCormick, Jr., Buchanan Ingersoll, PC, of counsel.

James W. Poirier, Washington, DC, with whom was Assistant Attorney General Peter D. Keisler, for defendant.

OPINION

MILLER, Judge.

This case involves the acquisition for the U.S. Army National Guard of a commercial aircraft converted to a military aircraft, the C-23B+, under a sole-source fixed-price contract. The finished product is quite the success; the C-23B+ is in service today, and some of the military aircraft are with our nation's servicemembers in Iraq. The success did not come without cost. Defendant agreed to pay approximately $150 million for twenty-eight aircraft. Plaintiff sued in the United States Court of Federal Claims to recover cost overruns that, as of trial, plaintiff calculated at $58.9 million.

Trial demonstrated that plaintiff, a sophisticated original manufacturer and maintenance provider of aircraft, undertook a major modification effort that it had never performed before, underestimated the effort that the scope of work required, grossly underestimated hours and costs, and was hobbled by its production subcontractor. For its

part, the military underestimated the effort that the scope of work required and exhibited questionable candor concerning the risks and costs that plaintiff faced.

Plaintiff produced and delivered twenty-eight aircraft based on what turned out to be a wholly inadequate government-approved proposal. Although the proposal period represented a singularly bilateral coordination effort on the part of the contractor and the military, plaintiff recorded, for the conversion alone, direct labor hours of 1,124,603 against the 253,531 estimated hours that formed the basis of its proposal. Where the fault for this discrepancy lay is the issue before the court.

PROCEDURAL HISTORY

Short Brothers, PLC ("plaintiff"), filed this lawsuit against the United States in the United States Court of Federal Claims on November 25, 1998. Short Brothers, PLC v. United States, No. 98-894C. The complaint sought relief on the following nine counts: two counts for illegal fixed-price contract; impossibility; commercial impracticability; failure to disclose superior knowledge; mutual mistake; defective government-furnished property; breach of implied duties of good faith, cooperation, and fairness; and unjust enrichment. The United States answered, and after completion of two years' discovery, defendant moved for summary judgment on March 13, 2001. Briefing on defendant's motion was completed in September 2001, and, after a ruling had not issued by October 2002, the parties filed motions for leave to file supplemental authority. The supplemental briefing was added to the record as of February 26, 2003, and the case was reassigned to the undersigned on March 10, 2004. As of that date, the summary judgment motion still was pending.

On March 18, 2004, an order entered that granted in part and denied in part defendant's motion for summary judgment and scheduled trial. Short Brothers, PLC v. United States, No. 98-894C (Fed. Cl. Mar. 18, 2004) (unpubl.) (the "Summary Judgment Order"). Surviving the Summary Judgment Order were plaintiff's claims for commercial impracticability, failure to disclose superior knowledge, mutual mistake, and defective government-furnished property. Plaintiff's claims for illegal contract and impossibility were adjudicated in defendant's favor. The parties proceeded to trial beginning in January 2005. 1/

1/ The court considered the testimony of every witness, although discussion of each one is not necessary to render this opinion. Plaintiff presented the following fact witnesses: (1) John W. Ballard, a methods engineer, currently Senior Industrial Engineer at Bombardier Aerospace ("Bombardier") in Belfast, employed by plaintiff during the relevant time period as Work Study Engineer from 1978 to 1994, and Methods Engineer from 1994 to 1998, with

1/ (Cont'd from page 2.)

prior experience in the Royal Navy; (2) Kenneth S. Brundle, a member of plaintiff's Board of Directors, currently semi-retired with the position of Vice Chairman, formerly plaintiff's Vice President of Manufacturing from 1990 to 1995; Vice President of Aircraft, Aerospace Operations from 1995 to 1996; Vice President and General Manager for Aerospace Operations from 1996 to 2000; and Executive Vice President and General Manager for Aerospace Operations, Bombardier Aerospace Operations Group, from 2000 to 2003; (3) C.W. Stephen Bowyer, currently a self-employed business owner, a licensed FAA DER (Federal Aviation Administration delegated Designated Engineering Representative), employed at West Virginia Air Center ("WVAC") as Chief Engineer from 1992 to 1995, with prior employment at de Havilland Inc. in Toronto; (4) Patrick N. Cowan, currently Engineering Project Manager in Montreal for Bombardier, former Engineering Manager for the C-23B+ project and, prior thereto, Head of Design Engineering Support Group – Aircraft Division; (5) Thomas P. Dillon, a finance manager for plaintiff in Belfast, who served as a senior financial analyst for the C-23B+ project; (6) Cathryn Crone Gilmore, Contract Manager for the C-23B+ in 1995 and the Contract Director beginning in 1996; (7) J.D. Luchuck, CPA, currently the Finance Lead at WVAC, former Short Brothers (USA), Inc. ("Shorts Inc.") employee in 1995 and later Staff Accountant for WVAC from 1996 to 1998; (8) Diarmuid B. Maguire, plaintiff's Designated Commercial Manager for the C-23B+ proposal; (9) Stephen G.D. McCoy, currently WVAC General Manager, formerly plaintiff's C-23B+ Program Manager from January 1993 to October 1994, when he became Operations Manager at WVAC and then C-23B+ Program Manager at WVAC from July 1996 to July 1997; (10) Russell W. McFadden, currently General Manager Composites for Bombardier, formerly Director of Manufacturing Engineering in 1993; (11) John C. Nesbitt, currently Program and Contracts Manager on two Bombardier programs, formerly Program Manager for the C-23B+ project from time of award to October 1994, when he became WVAC General Manager until December 1995; and (12) Danielle Thibaudeau, Chartered Accountant (the equivalent of a CPA), and former Bombardier employee from 1997 to 2004, initially an internal auditor and finally Manager of General Accounting within a division called BTNA.

Plaintiff's expert witness in aircraft manufacturing, new aircraft manufacturing, engineering remanufacturing processes and aerospace estimating methodology was Allen C. Haggerty, currently President of the Embry-Riddle Aeronautical University Engineering Advisory Board, a trained aeronautical engineer and former aerospace executive at Boeing and McDonnell Douglas.

OVERVIEW OF THE PROCUREMENT

In 1993 the United States Government, through the U.S. Army Aviation and Troop Command ("ATCOM"), entered into Contract No. DAAJ09-93-C-0656 with plaintiff for the procurement of twenty military aircraft with an option for an additional ten; U.S. Army National Guard (the "Guard") was the customer. The aircraft was to be known as the C-

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1/ (Cont'd from page 3.)

Defendant called two fact witnesses: (1) Paul E. Lutz, currently employed by the Army Aviation Systems Command ("AVSCOM"), the predecessor to the agency that commandeered the C-23B+ Division, as Aerospace Engineer in the Fixed Wing Engineering branch in the Systems Engineering Division; and (2) Steven S. Mead, Contracting Officer in charge of the acquisition of the C-23B+.

Defendant's expert in scheduling and delay analysis was Thomas C. Caruso, an attorney currently employed at Navigant Consulting in Denver, Colorado, as a director performing claims analysis, with employment history in the construction business, including serving as Project Engineer with Western Fuels-Utah, Inc., and Chief Capital Construction Officer for Long Island Railroad.

Seven witnesses testified by deposition: (1) Sam Coey, deposed August 11, 2000, retired Belfast employee, stress engineer; (2) Kevin Crawley, deposed on July 26, 2000, employed in plaintiff's Sales Department during the pertinent time period; (3) Ian Heaton, deposed on August 1, 2, 3, and 9, 2000 (consecutively paginated under two systems, the first referred to herein as "Heaton I" and "Heaton II"), former Director of New Programmes for plaintiff; (4) Tom Mansfield, deposed on August 3, 2000, Engineering Project Manager for the C-23B+ project; (5) Harry Stripe, deposed on August 11, 2000, former Design Engineer and Structural Engineering Manager for plaintiff and former member of the Royal Air Force; (6) William H. Pentz, deposed on July 6, 2000, consultant to WVAC during 1992 who subsequently served as Program Manager at WVAC, and a former member of the United States Army, including work as Production Director for Defense Contract Audit Systems and Director of Contracts at Raytheon; and (7) Larry R. Wright, deposed on October 2, 2000, Avionics Manager for plaintiff and later Production Manager on the C-23B+ project during approximately December 1996.

The parties counter-designated portions of these depositions. The court advised them during trial that it might consider portions not designated, as well, in order to understand and give context to the designated testimony.

23B+, 2/ a modified version of older, commercial aircraft previously manufactured by plaintiff known as the SD3-60. While a C-23B+ aircraft had never been manufactured prior to this contract, its procurement stemmed from the Guard's need for an additional number of aircraft that plaintiff, the original equipment manufacturer, had discontinued, known as the C-23B, or C-23B Sherpa. The C-23B+, or the C-23B+ Sherpa, was to augment the Guard's fleet of sixteen C-23B's; its mission was to perform a medical evacuation role in support of the Army National Guard Aviation Classification Repair Activity Deport System and Theater Defense Force Airlift requirements. The C-23B+ also had to be capable of airdropping cargo and paratroopers.

The critical procurement events, to be described in detail, begin not with the issuance of the Request for Proposal (the "RFP"), but with the parties' development of the Statement of Work (the "SOW"), a document incorporated into the contract that set forth the requirements for contract performance. SOW development occurred predominantly during 1992.

The Government issued the RFP on January 13, 1993, which was to be sole-sourced through plaintiff. Plaintiff submitted its first formal proposal on February 22, 1993, and, after a series of audits and revisions, submitted final updates on May 24, 1993. The parties conducted contract negotiations during August 1993, and the Government awarded Contract No. DAAJ09-93-C-0656 to plaintiff on September 30, 1993.

The contract called for major modification work 3/ to the second-hand SD3-60 aircraft, which, as part of its work under the contract, plaintiff would select and induct into the program. The conversion of the commercial SD3-60 aircraft, an analog to the C-23B,

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2/ The aircraft at issue in this case initially was referred to as the C-23C and later renamed the C-23B+. For consistency it will be referred to, generally, as the C-23B+; however, for purposes of document identification, titles of documents in evidence containing the term "C-23C" will not be changed.

3/ The court uses the term "major modification" descriptively in these findings. The term "modification" as it appears in the SOW, other pre-contract documentation, and the contract is significant to plaintiff, which advocates that the conversion was a "straightforward modification" effort versus a "remanufacture." As the court's analysis reflects, the court did not find that the use of either term delimited or otherwise categorized the conversion. Rather, it is the nature of the tasks to be performed that controls. The court has found that plaintiff understood the tasks in the SOW sufficiently to have assumed the risk that it could convert the aircraft within the parameters of its technical and cost proposals. Plaintiff was not misled by the term "modification."

into a military C-23B+ encompassed discrete tasks required to meet the performance specifications set forth in the contract, including, but not limited to, the following major items: remove the tail of the SD3-60 and replace with a new twin fin tail with a rear ramp; remove a 36-inch section of the fuselage to shorten the aircraft, rejoin the sections and replace all electrical systems; install improved avionics systems; modify the cockpit; install new seats and cargo equipment; add a role beam to support a paratrooper- and cargo handling- air drop performance specification; and install thirty-seven items of new electronics.

The converted aircraft would replicate most, if not all, of the functions of the C-23B, other than performance. The Guard did not require a typical 30-year life of an airplane, flying at 2,500 hours. As described by Ian Heaton, plaintiff's Director of New Programmes, who was involved in developing the milestones for the project, "[W]e were trying to produce both a lookalike and an operationally similar airplane so that a crewman could step . . . into a C-23B+ from a C-23B and effectively not really notice the difference." Deposition of Ian Heaton, Aug. 1-2, 2000, at 34 ("Heaton I"). "The [SD]3-60 to C-23B conversion required the supplying of what was essentially 20% or whatever of a new aircraft that we had manufactured before into an old airplane[.]" Id. at 42.

FACTS

I. BACKGROUND

1. Plaintiff and its businesses

Short Brothers, PLC ("plaintiff"), is a Public Limited Company organized and existing under the laws of Northern Ireland, with its principal place of business in Belfast, Northern Ireland. It is a subsidiary of Bombardier Aerospace ("Bombardier"), which acquired plaintiff in 1989, after which plaintiff took on the name Bombardier Shorts. Prior to the Bombardier acquisition, plaintiff was a government-owned aerospace company. Bombardier is based in Montreal, Canada; its plants are Canadair in Montreal; de Havilland Inc. ("de Havilland") in Toronto; the Canadian plants in Toronto; and Bombardier Shorts (plaintiff) in Belfast, Ireland.

As a result of the acquisition, plaintiff's Belfast headquarters (referred to at times as "Belfast") was reorganized into three business units: the aerospace or aircraft unit, the nacelles unit, and the fabrications unit. Bombardier also invested approximately half a billion U.S. dollars into plaintiff, including 200 million pounds to develop plaintiff's fabrications business unit. The fabrications business unit consisted of four sites in Belfast: the sheet metal manufacturing site, the composites manufacturing site, the metal bond

manufacturing site, and the machining manufacturing site. Plaintiff since has developed into a successful manufacturing company, winning the best-manufacturer award in 2000 for the entire United Kingdom.

In 1991 plaintiff was organized into the following principal departments: Product and Logistics Support Department ("PALS"), part of the Support Services Division; Operations; Engineering; Procurement; Sales and Marketing; Finance; Human Resources; Commercial; and Commercial/Contracts.

Plaintiff's subsidiary, Short Brothers (USA), Inc. ("Shorts Inc."), a United States trading company based out of Washington, D.C., was engaged primarily in marketing, but also played a role on leasing and support for plaintiff's commercial aircraft. A. Oakley Brooks, Jr., was in charge of the sales arm, Shorts Inc.

2. Plaintiff's prior production

Prior to 1992 plaintiff was primarily a commercial aircraft manufacturer, although it had ventured into several military programs, involving contracts with various governments. It manufactured the Tucano Warcraft, which was a training military aircraft purchased by the United Kingdom Ministry of Defense and delivered to the Royal Air Force in England; the Tucano also was sold to the Kenyan Air Force and the Kuwaiti Air Force.

Of primary relevance to this case, plaintiff also manufactured the SD3-series aircraft, which included five variants from the initial design and production of the Skyvan aircraft. Plaintiff manufactured the SC-7 Skyvan aircraft in the 1960s for commercial freight or passenger purposes, which accommodated nineteen seats. From the Skyvan aircraft, plaintiff developed the SD3-30 in 1974. The twin fin tailed SD3-30 was a thirty- or thirty-three-seat commuter aircraft. In the 1980s the SD3-30 design evolved into three newly developed aircraft: the SD3-60, the UTT, and the C-23A.

The SD3-60 was a thirty-six-seat aircraft tailored specifically to the commuter market. It had larger engines than the SD3-30, and its fuselage, or the body of the aircraft, exceeded the SD3-30 by 36 inches. The tail of the SD3-60 was a single fin. Both the SD3-30 and SD3-60 were among the first aircraft in the industry to have a full standup galley, overhead baggage lockers, and a lavatory. The UTT was a utility tactical transport aircraft with some paratroop capability that was developed for military purposes. Few were actually built, some of which went to the United States Army; one went to Venezuela.

In 1985, after the manufacture of the SD3-60 and the UTT, plaintiff designed and manufactured the C-23A. This aircraft design was also developed from the design of the

SD3-30, with smaller engines than the SD3-60. Plaintiff built the C-23A for the United States Air Force for use in Europe as a freighter. The C-23A had an outward-opening ramp door for cargo loading and no windows. Plaintiff produced eighteen of the C-23As, and the Air Force deployed them at Zweibrucken Air Base, Germany, and in England. When Zweibrucken Air Base closed, the C-23As were redistributed to the Guard and the U.S. Forest Service, while some remained with the Air Force.

Based on the design of these three aircraft, the SD3-30, the UTT, and the C-23A, plaintiff in 1990 designed and manufactured a more advanced military aircraft known as the C-23B Sherpa. While derived from the designs of the earlier SD3-series aircraft, the C-23B, like the others, was not a modified aircraft, but was newly designed and manufactured, referred to as a "production aircraft." The C-23B was based primarily on the structure of the SD3-60, although its fuselage was shorter than that of the SD3-30 and it had twin fins for a tail, like the SD3-30. Its engines were larger, and it had a new rear ramp door that opened both inward and outward, which allowed for paratrooper capability or dropping of other payloads during flight. The C-23B, manufactured under the auspices of the United States Army Aviation Systems Command ("AVSCOM"), 4/ predecessor to ATCOM – for the Guard, was the last aircraft to come off plaintiff's Belfast production line, and it was put directly in service during Operation Desert Storm.

Although plaintiff was primarily a new aircraft manufacturer, it maintained ongoing relationships with its customers to support the aircraft in-service. Plaintiff tasked three groups of engineers with engineering support. First, field engineers were sent to work with the customers on any of their needs that might arise. Second, Belfast maintained a set of core engineers who were available to answer questions any of the aircraft operators might have. Third, an engineering group was responsible for producing and maintaining technical publications and manuals for the aircraft.

As an aircraft manufacturer, plaintiff also had responsibilities for its product for many years of its service life. When issues or undetected and unforseen problems emerged after delivery, plaintiff would issue "service bulletins" to instruct aircraft operators on a particular modification to the aircraft. A standard service bulletin would include detailed instructions, a set of parts (or "kits"), and any needed design information that an operator would use to conduct a repair or a modification.

4/ Although AVSCOM was not incorporated into ATCOM until October 1, 1992, it will be referred to as ATCOM for consistency.

Plaintiff also undertook contracts to perform maintenance and discrete modification or refurbishment 5/ tasks to its aircraft already in service. For example, plaintiff performed maintenance work and modification incorporation on the C-23A for the United States Air Force at Zweibrucken Air Base, Germany. Plaintiff also provided on-site and technical support for its Tucano aircraft post-delivery. Plaintiff maintained the aircraft, provided engineering support, and even performed some modification work. "One of the biggest" was performed for ATCOM on the C-23B during approximately 1992. Transcript of Proceedings, Short Brothers, PLC v. United States, No. 98-894C (Fed. Cl. Jan. 10 - Feb. 25, 2005), at 1057 ("Tr."). As John C. Nesbitt, an experienced Program Manager for plaintiff, recalled, this involved the fitting of a flight mechanic's station in the aircraft.

The upkeep of the SD3-series aircraft after manufacture during the early 1980s was carried out at several locations around the world, but the primary North American site for modification/refurbishment work for the SD3-series aircraft was Fields in Calgary. Even the United States Army used Fields in Calgary to put on service bulletins for four particular SD3-30 aircraft prior to 1992 that the Army had acquired from the Federal Aviation Administration (the "FAA") (having seized the aircraft from a bankrupt Golden West).

Plaintiff maintained its own fleet of SD3-series aircraft, which its subsidiary Shorts Inc. leased out to other operators. During the early 1990s, plaintiff and Shorts Inc. began using an American aircraft facility to conduct repair maintenance and overhaul activities. This facility and company, known as West Virginia Air Center ("WVAC" or "Air Center"), was at the time a new facility but soon to become a major player in the contract at issue in this case.

3. West Virginia Air Center

Trial was as much about the evolution of the major subcontractor as it was about the odyssey of a government contract.

Located at Benedum Airport in Bridgeport, West Virginia, WVAC, a Bombardier-owned aircraft maintenance facility, is in full operational status. It performs maintenance and repair work on plaintiff's fleet of aircraft, and also holds large contracts for similar work for several major commercial airliners, including Delta Air Lines, Inc., and Northwest

5/ The terminology "modification" and "refurbishment," and the characterization of the work that they imply, are at issue in this case. The precise import that the parties ascribed to these terms will be discussed. See *supra* note 3.

Airlines/KLM. WVAC recently expanded and now has a similar air center in Tucson, Arizona.

WVAC was conceived around 1990, but not as a Bombardier off-shoot. Instead, two wealthy families of entrepreneurs, the Comptons and the Koukolis, sought to create an air maintenance facility. Kenneth S. Brundle, then plaintiff's Vice President of Manufacturing who would go on to become Executive Vice President, Aerospace Divisions, Bombardier Aerospace Group, in Montreal, Canada, and finally Vice Chairman of plaintiff in Belfast, attended meetings with the Comptons and the Koukolis during the 1990 time frame to discuss the families' concept of creating a SD3-30 and SD3-60 maintenance base. The end result of these meetings was WVAC.

WVAC was one of few facilities in the United States large enough to accommodate a full modification line, which requires a facility with sufficient hangar space for simultaneous work on multiple aircraft, as well as storage space and a paint facility. At the time WVAC was housed in a 145,000-square foot maintenance support center with two large maintenance bays, two paint bays, and various departments.

WVAC was destined to become the prime subcontractor responsible for performing the modification activity because the funding limitations for the C-23B+ project were to require the modifications to be "performed in the United States under a license agreement with the original manufacturer[.]" Department of Defense ("DoD") Appropriations Act, 1992, Pub. L. No. 102-172, § 8105, 105 Stat. 1150, 1198 (1991). The statute thus mandated that the production facility be located in the United States. Plaintiff considered WVAC as the best choice to perform the modifications based on WVAC's prior experience with the SD3-series aircraft. WVAC also shared a runway with a Guard C-23B detachment and was located near the C-23B Logistics Support Office. Diarmuid B. Maguire, plaintiff's Commercial Manager, who negotiated the contract with ATCOM, related: "[W]hen ATCOM, in the January '92 program review, outlined the timetable for completion of negotiations, they were notified that we had an existing teaming agreement in place with WVAC and it was our intention to base the work there."

4. WVAC's prior work

From its inception WVAC was a commercial house dealing with FAA procedures and doing FAA-related civil work. WVAC performed repair, maintenance, overhaul, and modification work for plaintiff's own fleet of SD3-30s and SD3-60s during the early 1990s. Work at WVAC included maintenance checks, also known as letter checks.

At an airliner's request, WVAC would be hired to place the aircraft on the shop floor and complete an inspection to the customer's requests. The extent of the inspection, and thus the amount of work required, would depend on the level requested by the owner. Letter inspections went from a relatively simple "A check" up to a "D check," which essentially required a complete strip down of the entire aircraft. WVAC also was involved in maintenance checks for aircraft that were owned by leasing companies. Prior to releasing an aircraft, a leasing company often would send the aircraft out for inspection to a facility such as WVAC to insure that it was in good condition. Both kinds of maintenance checks did not involve solely inspections. Any problems found would require repair, and customers often would request that WVAC carry out tailored modifications to the aircraft or install service bulletins.

At the time of negotiations concerning the procurement of the aircraft involved in this case, WVAC had been the most recently utilized maintenance facility for plaintiff's own fleet of SD3-30s and SD3-60s.

5. The prior contract between plaintiff and ATCOM for the C-23B

Plaintiff's prior significant dealings with ATCOM involved the C-23A and C-23B aircraft. A twin fin tailed military aircraft with some paratrooper capability, the C-23B was developed specifically for ATCOM.

Ultimately, ATCOM became the only customer for the C-23B, which could not justify a full production line. Plaintiff decided to close production of the C-23B as of 1992. ATCOM initiated meetings with plaintiff in early 1991 for the purpose of continuing the supply to the Guard.

II. C-23B+ PROJECT DEVELOPMENT

1. Origin of the project

Although the formal RFP for this contract issued in January 1993, it did not trigger negotiations between plaintiff and ATCOM. In fact, by January 1993, both parties had developed a specific focus on a future project. Understandably, witness recollection of the events that transpired in 1990 or earlier, some fifteen years before trial, occasionally was nonspecific. With that caveat, it is known that the seeds of the Government's interest in this project trace to some early point during 1990, when the Guard determined that it wanted continued delivery of aircraft with performance capabilities that met or exceeded those of the C-23B.

While the Guard was establishing its own need for additional aircraft, plaintiff was in the process of closing down its Belfast aircraft production lines. However, it was not until production had ceased on the C-23B aircraft, hangars reallocated, and tools dismantled that ATCOM formally approached Mr. Brundle – then Vice President of Manufacturing for plaintiff – to inquire whether plaintiff could restart production on the C-23B aircraft. 6/ Mr. Brundle informed ATCOM that production to meet the Guard's needs was not sufficient to justify a full production line. ATCOM responded by asking plaintiff to meet in early 1991 with an alternative means for fulfilling ATCOM's requirement of ten additional C-23 aircraft.

The evidence concerning plaintiff's motivations for attempting to meet ATCOM's additional requirements did not reflect much consistency. Messrs. Nesbitt and Brundle painted a picture of a somewhat disinterested reaction to ATCOM's initial prodding, by explaining that plaintiff's core business no longer was aircraft manufacturing. Instead, plaintiff was becoming more involved with Bombardier programs and generally operating as an aerostructures facility; it did not expect further business from the C-23 program, nor would the C-23B project be a long-term business relationship with the U.S. Government. Undertaking a new C-23B project therefore was, according to Mr. Brundle, not considered a strategic business decision. On the other hand, Harry Stripe, a design engineer for plaintiff who in the early 1990s was Head of SD3 and Special Project Design, and who was responsible for the design, structural change, furnishing changes, and ground equipment for the project, indicated the opposite – that plaintiff not only wanted the military to require more C-23 aircraft, but that plaintiff in fact hoped that the military would request a sufficient quantity to render restarting of the production line a viable option. Deposition of Harry Stripe, Aug. 11, 2000, ¶ 81.

The C-23B contract with ATCOM, while handled directly between ATCOM and Belfast, involved, to a large degree, sales work and liaison activity by plaintiff's American-based subsidiary, Shorts Inc. Both the President of Shorts Inc., Mr. Brooks, and C.S. Compagna, Shorts Inc.'s Program Manager for Military Aircraft, were key players in the negotiations for the development of the C-23B+ contract. They dealt directly with representatives of ATCOM, and, of course, Shorts Belfast. Mr. Brooks's role also included lobbying efforts to Congress and the DoD for the purpose of obtaining business opportunities for plaintiff, although the extent of these lobbying efforts was not established during trial.

6/ Ian Heaton, plaintiff's Director of New Programmes who was not directly involved in the beginning of these discussions, testified that plaintiff was aware of ATCOM's interest in a new product line and took it into consideration when deciding to close down its SD3-series aircraft production line. Heaton I Dep. at 23-24.

Whatever inconsistent opinions characterize Belfast, Shorts Inc., the American subsidiary, definitely had a fixed objective. Mr. Brooks was anxious for the business. He had a business relationship with WVAC. Shorts Inc. held meetings with WVAC early in 1991, including a June 11, 1991 program review. The United States subsidiary was also pitching the C-23B+ project to Belfast, and its aspirations and evaluations of additional work for the United States Government were aligned accordingly. Shorts Inc. and/or Belfast produced a preliminary business plan in January 1991, reflecting nothing but positive business implications for developing plaintiff's U.S. contracts. The preliminary business plan indicated that such work would also be aligned with plaintiff's goals with WVAC, its "U.S. partner." In at least a broad sense, the evidence showed that Shorts Inc. initiated marketing for future United States military procurements in the early 1990s. WVAC, too, was involved early on. According to Mr. Heaton, a "letter of understanding" existed between plaintiff and WVAC that committed plaintiff to use WVAC if plaintiff obtained the contract for the C-23B+, provided that WVAC elected to go forward. Heaton I Dep. at 44.

However plaintiff's varied motivations became catalogued into actual production planning, it is clear that by June 1990, plaintiff had developed a concept and even priced a rough order of magnitude for the project. This occurred prior to the issuance of the Request for Proposal and before Congress had stipulated the requirements for the procurement. 7/

7/ The parties have referred to the DoD Appropriations Acts for 1991 and 1992 as the source of congressional authority and funding allocations for this project. See DoD Appropriations Act, 1992, Pub. L. No. 102-172, 105 Stat. 1150; DoD Appropriations Act, 1991, Pub. L. No. 101-511, 104 Stat. 1856 (1990). Neither of these appropriations acts explicitly grants spending authority for any C-23 aircraft. Section 8105 of the DoD Appropriations Act for 1992, however, references the funds made available for C-23 aircraft and delineates certain procurement requirements that effectively limited any contract to plaintiff:

> Notwithstanding any other provision of law, none of the funds made available to the Department of the Army for fiscal years 1990, 1991, and 1992 for C-23 aircraft which remain available for obligation may be obligated or expended except to maintain commonality with C-23 Sherpa aircraft already in the Army National Guard fleet, and such funds may not be obligated for acquisition of modified commercial aircraft, unless the modifications are performed in the United States under a license agreement with the original manufacturer and are in accordance with the SD3-30 aircraft type specification as modified for Army mission requirements.

DoD Appropriations Act, 1992 § 8105, 105 Stat. at 1198-99.

2. Development of the Statement of Work

What began as a concept developed into an outline of the required work, the SOW ultimately became part of the contract delineating the specifications of the project. It drove the subcontactors' proposals. It formed the skeleton for all pricing estimates. It went through numerous iterations throughout pre-contract negotiations. And while the SOW was only the first of at least three levels of progressive detail describing the actual work, 8/ it was the starting point for concept, design, and performance. Its purpose, as understood by both ATCOM and plaintiff from the beginning, was accurately to describe the work that would be contemplated in performance. ATCOM's Business Clearance Memorandum, dated August 3, 1993, viewed the SOW rather as a "detailed" plan for work, such that "uncertainties can be identified and estimates of their cost impact can be made." The SOW, however, did not describe how the work was to be performed; rather, as Kevin Crawley, an organizer who headed up the Shorts Belfast team participating in SOW discussions testified, it described what work was to be done. Deposition of Kevin Crawley, July 26, 2000, ¶ 108.

The SOW would provide the list of tasks that the contractor would be required to perform in order to successfully convert the donor aircraft into the C-23B+ product. It was not by any means a one-sided creation, nor was it a ready-to-go request for proposal with a pre-packaged list of tasks for the contractor to propose to. Instead, it was the product of two objectives: the Guard's need for additional aircraft, and plaintiff's willingness to do business with ATCOM – that is, develop a plan to meet the Guard's needs without using a new-manufacture program. The only option on the table for plaintiff was to take existing aircraft and modify them into whatever the Guard wanted.

7/ (Cont'd from page 13.)

Pursuant to the above-quoted language of the DoD Appropriations Act, 1992, Congress limited ATCOM to procure, on behalf of the Guard, additional C-23 aircraft that would have commonality with the C-23s already in the Guard's national fleet. ATCOM's Business Clearance Memorandum dated August 3, 1993, states that "[t]he basic requirement is for 20 aircraft (10 each with FY 91 and 92 funds) and a FY 94 option for 10 each."

8/ The work set out by the SOW was described by the Work Breakdown Structure (the "WBS"), which was further delineated by Work Procedure Sheets ("WPSs"), which in Belfast were called Engineering Process Records ("EPRs"), all of which will be described in detail.

Plaintiff's conceptual work and rough order of magnitude pricing, including preliminary design work, were underway throughout 1990 and 1991, during which period the content of the SOW was anything but certain. Some discussion occurred about a SOW in 1991 involving both parties, 9/ but this was premature to the actual SOW deliberations, which occurred in 1992.

Development of the SOW formally began with ATCOM's authorship of the first draft SOW in January 1992, which it supplied to plaintiff. It was a document of seven pages, and ATCOM produced it shortly after writing a January 3, 1992 memorandum to the Guard requesting responses to various questions related to the what the Guard sought in terms of performance specifications, such as the number of years of service expected of the aircraft and any differences in performance capabilities. ATCOM was proceeding from a comparison between what the Guard already had procured, the C-23B aircraft, and what the Guard expected from the C-23B+. ATCOM also knew, however, that it would be unable to prepare the final SOW because, as Contracting Officer Steven S. Mead noted in a November 18, 1992 Memorandum for Record, "the Government lacked technical data with which to prepare a [SOW], and the Government needed to enter into a dialog with industry to get this information."

With a draft SOW in hand, plaintiff and ATCOM proceeded with several meetings, some in St. Louis and others in Belfast, during which the SOW was developed through a series of drafts. In addition to plaintiff and ATCOM, WVAC representatives attended not so much as contributors, but more as observers. That is not to suggest WVAC had no involvement in the development of the SOW. The elements of the SOW were broken down by plaintiff into the Work Breakdown Structure (the WBS"), which was the listing of tasks

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9/ During May 1991, Mr. Brooks reported to Belfast via a May 16, 1991 activity report that ATCOM asked plaintiff to draft a SOW based on the SOW for an unrelated project, the CH-47 Chinook modification program. Mr. Nesbitt could not recall this. Shortly thereafter, Shorts Inc. conducted a June 11, 1991 Program Review, with WVAC and a few non-parties in attendance, wherein it was anticipated that SOW development would commence in October 1991 and last approximately seven months.

The Program Review included discussions concerning a production schedule and a rough outline of the work required for what was called the "C-23C modification program." Although Belfast representatives were not in attendance at the June 11, 1991 program review, Belfast had been working with Shorts Inc. all along; Mr. Brooks and Shorts Inc. could not have put together a program review of this nature without input from plaintiff.

to meet the SOW. Mr. Heaton said that WVAC had become "heavily involved" in producing the WBS for over a year before he stepped into the project. Heaton I Dep. at 40.

While ATCOM took the lead and authorship during the development of the SOW, plaintiff was the "principal contributor," according to Mr. Heaton. Heaton II Dep. at 210. They worked together, jointly, on all aspects, freely passing information back and forth and participating equally on all issues. Paul E. Lutz, ATCOM's admittedly inexperienced engineer who participated in drafting the SOW, testified that the SOW was ultimately a "government document," Tr. at 4243-44, although he described the process and the participants, as follows: "Shorts, the Guard, and I'll say AVSCOM, because that would include program office, contracting office and engineering, we all participated in the drafting of the [SOW]. In fact, we freely passed back and forth information to try to create the [SOW]." Tr. at 4242. When asked what aspects plaintiff helped draft, he responded, "With respect to what I helped draft, which would be more than the technical aspects, because there were other aspects, Shorts and ourselves and the Guard, we all participated generally equally on all of the issues." Id.

The basic structure of these meetings, and the interim work, involved plaintiff's recommending changes to the content of the SOW. ATCOM had ultimate responsibility for the SOW and, based on its decisions, would revise the SOW accordingly. For example, the January 1992 draft SOW was based on the conversion of the SD3-30 aircraft. 10/ Because the Guard and ATCOM did not approve it, a June 24, 1992 revision substituted the SD3-60 aircraft. 11/ This was a particularly contentious switch, one that did not have the support of

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10/ ATCOM did have input from plaintiff prior to the creation of the January 1992 SOW draft. However, that input came from plaintiff's rough order of magnitude work, which plaintiff created without knowing the extent to which the Guard was expecting an aircraft similar to the C-23B. Thus, the 1990 through 1991 work all took place premised on plaintiff's initial decision to use SD3-30 aircraft for the conversion into the C-23B+. And that decision came prior to ATCOM's actually setting the technical requirements, or performance specifications, for the C-23B+. Plaintiff had no role in making determinations of what the Guard wanted in terms of performance of the C-23B+. Insofar as plaintiff was assisting ATCOM with pre-SOW planning, plaintiff and ATCOM proceeded on an expectation that the SD3-30 would be the appropriate donor aircraft. The January 1992 first draft of the SOW, accordingly, was based on the SD3-30.

11/ The draft SOW contains a handwritten notation which appears to be a "SD3-60" beside the term "commercial aircraft." Mr. Crawley, who led the Belfast team in developing the SOW, tied the SD3-60 to this draft. Crawley Dep. ¶ 102.

all of plaintiff's team because it fundamentally altered the nature of the tasks required for the modification.

As of that date, plaintiff had developed its work concepts and rough order of magnitude based on the SD3-30, in part because it was less costly. During spring 1992, however, with SOW development in progress, plaintiff learned that the Guard was seeking an aircraft that would have equal to or greater performance capability than the C-23B. ATCOM asked plaintiff to provide a comparison of a converted SD3-30 and a converted SD3-60.

Plaintiff responded by providing ATCOM a "first cut" of the SD3-60 modification on May 19, 1992. This was based in accordance with a design engineering department assessment of the comparative viability of the SD3-60 and SD3-30 for the project, as documented by plaintiff's March 9, 1992 Strategic Planning Committee C-23C Project Review. This Project Review notes that the C-23B aircraft were produced from the SD3-60, not the SD3-30, and that "from structural design viewpoint pre-owned 360s [SD3-60s] offer best solution for conversion to C-23B configuration." It also lists the modifications required.

Dissent among plaintiff's team to change to the SD3-60 in part stemmed from the known fact that converting the SD3-60, as opposed to the SD3-30, was more costly. 12/ Mr. Heaton viewed the switch as a "change of direction[,]" Heaton I Dep. at 34, and believed that plaintiff was too far along using the SD3-30s. He also expressed some irritation with governmental wavering: Plaintiff was required to "keep chasing the Government to define what they wanted," because the "Government was struggling to give us a performance definition of what was wanted[.]" Id. at 99-100.

Ultimately, ATCOM decided to use the SD3-60, instead of the SD3-30, because the SD3-60s more closely matched the performance capability of the Guard's C-23B aircraft fleet, commonality with which was desired and, in fact, required by the DoD Appropriations Act, 1992 § 8105, 105 Stat. at 1198-99.

12/ The SD3-60s would have cost more to purchase as they were at a higher market rate. In addition, the longer the design work took on the donor aircraft, the more costly it would be, hence, the fewer aircraft could be modified.

While it was ATCOM that mandated the use of the SD3-60, the decision was guided by plaintiff 13/ because, after all, it was plaintiff's own comparison conclusions that were the basis of the decision. 14/

SOW development foreshadowed an issue, a particularly prophetic one, that arose regarding the June 24, 1992 draft SOW's use of the term "remanufacture" in the scope of work clause. The topic came up at a June 29, 1992 meeting during which the parties discussed the June version of the SOW. Plaintiff questioned ATCOM about the scope clause, which at that time described the project as requiring "remanufacturing" of the donor aircraft, because plaintiff believed that the term misidentified the extent of the task:

> [I]n our understanding the word "manufacture" or "remanufacture" meant taking raw material and developing an object from raw material, or taking an existing object, completely disassembling it and performing new operations with it before putting it back together again. At the time of the [SOW] discussions we did not conceive that the task to be undertaken was as big as disassembling the whole aircraft. It was a much simpler task.

13/ Mr. Lutz testified that he sought out Mr. Stripe, the Belfast design engineer, who told him that the design work was a "piece of cake." Tr. at 4241. Defendant makes too much of this characterization. Mr. Stripe's deposition testimony revealed that he uses the vernacular and generalizes. He explained what he intended by that expression:

> Certainly it is an expression I tend to use. On the design side I don't know whether I would have said that to the Government people, but certainly to our own in talking I would have thought in terms of the design that it was straightforward and maybe a piece of cake, yeah, sure, for an experienced team, for experienced people.

Stripe Dep. ¶ 121. Mr. Stripe also testified that he "had 20 odd years experience of the 3-30 family and [he] was quite confident in [his] ability and in the ability of [his] staff to do it [the conversion]. It is a fairly straightforward job in design terms." Id. ¶ 112.

14/ In fact, plaintiff and ATCOM met in Belfast on May 18 and 19, 1992. The meeting minutes dated May 21, 1992, prepared by plaintiff, noted that "[ATCOM] asked why a 360 down modified aircraft had not been proposed as it would seem a natural fit, ie [sic] similar to evolution of 23B[,]" and that "[t]he Contracting Officer would not have a problem with a 360 being used."

Crawley Dep. ¶ 119. 15/

Notes of the meeting of June 29, 1992, reflect that Mr. Mead, the contracting officer in charge of acquisition, did not want the end product to reflect new aircraft, and ATCOM agreed to use the term "reconfigure." Mr. Crawley is synopsized as stating that he was "uncomfortable" with the term "remanufacture" because "English Law's definition of remanufacture suggests a full manufacturing process."

Resolution of these issues, along with many others, informed the revised July 10, 1992 draft SOW. Further meetings on the SOW occurred in August 1992, with revisions of the SOW issued in September and November 1992. The November 1992 version of the SOW essentially was the same as the final SOW, incorporated as part of the contract – subject to minor revisions until contract award.

3. The Work Breakdown Structure

Although the SOW expressed the parties' joint views as to what work would be required for the C-23B+ undertaking, it did not achieve a level of detail necessary to enable plaintiff to price the work. A description was required of the individual tasks necessary to accomplish what was set out in the SOW. The Work Breakdown Structure (the "WBS") filled this need. It listed all tasks necessary to meet the SOW work elements. Mr. Maguire, plaintiff's Designated Commercial Manager responsible for finalizing the proposals incorporating the subcontracts and negotiating with ATCOM, envisioned that the WBS would "enable a price negotiation to be concluded [that] would result in a fair and reasonable price to the contractor[.]" Tr. at 600.

Like the SOW, ATCOM had a role in its development. Unlike the SOW, however, this was a proposer's document. As Stephen G.D. McCoy, a thirty-year Belfast employee who originally was detailed to serve as General Manager of WVAC for the C-23B+ project and who still serves as WVAC's General Manager today, explained: "[T]he [SOW] is actually a very high level organization, and the WBS then starts breaking it down into much lower levels of detail." Tr. at 1781. Mr. McCoy testified that "the WBS was the basis for the proposal, the contract negotiations, and ultimately contract award." Tr. at 1783. The Government already had expressed what it wanted to procure. It was now plaintiff's turn to

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15/ Other witnesses testified that plaintiff had no understanding of the term "remanufacturing," and on that basis objected to ATCOM's use of the term, see, e.g., Tr. at 3956, 4108. Unlike Mr. Crawley, however, these witnesses were not actually involved in this particular discussion.

propose a technical, detailed plan of how the work should be performed. Accordingly, the Government assumed the role of auditor.

Each WBS took one particular provision in the SOW and extrapolated the necessary tasks to accomplish it. The WBS was a massive undertaking, and it was organized into a list of discrete tasks. Each task was assigned a WBS number. All of the WBS's, or WBS items, had individual WBS numbers; the final WBS was actually a list of numerous WBS's.

To illustrate, the SOW identifies section 3.2.5.11 as "Aircraft Modification," which obviously relates to the bulk of the task. It is divided into subsection 3.2.5.11.1, "External/Structural Modifications," and subsection 3.2.5.11.2, "Internal Modifications." The SOW further divides both subsections into multiple subsections that identify various parts of the aircraft and describe, generally, the work required. As an example, section 3.2.5.11.1(c) provides: "Forward Fuselage: Remove a 36 inch section from the forward fuselage between flight deck and wing to achieve C-23B fuselage geometry. The contractor shall perform all actions required to rejoin the aircraft to include: sheet metal, structural, wiring, control systems and all other affected systems."

Correspondingly, the WBS was organized into four sections, one of which, WBS Item 2.0, addressed "Design/Manufacture/Modifications" Multiple WBS's reference the corresponding SOW subsection. For SOW § 3.2.5.11.2, WBS Item 2.1.1 applies, which is broken down into 2.1.1.1, .2, .3, etc., with descriptions such as Detail Parts Manufacture, Refurbish and Modify Floor, Design, Electrical, etc. These headings specify the technical information found in the WBS; actual task descriptions of how to accomplish the tasks identified in the WBS are found in plaintiff's proposal, not in the WBS.

The final WBS, part of plaintiff's proposal, also assigned responsibility for each particular WBS item, either to plaintiff, WVAC, or another subcontractor. The level of detail contained in the WBS was important, as it not only described how plaintiff would complete the project, but it also allowed both plaintiff and WVAC to cost each particular item.

Just as the SOW was a government-authored document in which plaintiff participated, the WBS was a plaintiff-authored document developed by plaintiff and its principal subcontractors. ATCOM reviewed the WBS and agreed that the WBS was appropriate. From this point, plaintiff provided the WBS to the individual subcontractors for them to develop their bids.

At this early date, the WBS was not intended to be complete, as each subcontractor added to or enhanced its respective portions of the WBS throughout its proposal development, taking the WBS down to even greater detail. A subcontractor basically

supplied details in its respective portion of the WBS in conjunction with input from plaintiff. Just as the role the WBS played in terms of what performance and cost would entail could not be overstated, so, too, the role of the subcontractors' input could not be overstated. By "filling the gaps" of the WBS, the subcontractors were making crucial decisions on the contours of performance with consequences in the millions of dollars.

WVAC's role in developing the portion of the WBS that it would be required to complete was significant, but the primary creator was plaintiff. Plaintiff provided an initial WBS with the major structural elements, and WVAC, in turn, was responsible for the detail task descriptions. 16/ WVAC worked closely with Belfast in order to do so, including sending personnel to Belfast. Stephen C.W. Bowyer, WVAC's Chief Engineer, traveled to Belfast to observe the actual aircraft, take photographs, and obtain technical information about the aircraft from plaintiff, the Original Equipment Manufacturer (the "OEM"). In addition to developing detail task descriptions, WVAC also could request additional WBS items if WVAC found them to be necessary. Mr. Bowyer recalled having at least weekly communications with plaintiff as the WBS was developed.

Mr. Bowyer said the WBS was a "living document" undergoing changes throughout its creation. Tr. at 2152. Accordingly, it was reviewed on numerous occasions, and not just by plaintiff. ATCOM also had a role in its development, but its role – after approval of the initial WBS – was part of the proposal review process rather than actual participation in WBS development. Mr. McCoy recalled seven versions prior to contract award.

4. Over and Aboves

Although the SOW and the WBS described the work contemplated by the parties as necessary to modify the SD3-60 aircraft into the C-23B+ aircraft, it was always understood that not every aspect of the work could be anticipated. The SD3-60s used for the modification were older aircraft. The mandatory procedures for selecting the candidate aircraft were a quality control mechanism to help reduce the potential for unexpected repair work. Those procedures required plaintiff to conduct a pre-purchase inspection, which would enable plaintiff to choose only the best quality aircraft for the modification program.

16/ Indeed, as noted above, WVAC's work on the WBS traces to early work on an SD3-30 conversion. During the period when WVAC was developing a WBS for the SD3-30, Belfast representatives visited WVAC on November 19-20, 1990, at which point an undated draft of the visit notes indicates that "WVAC [was] working on a Work Breakdown Structure (WBS) for each modification." DX 1044.

Like any inspection, however, the extent to which problems could be revealed depended on the extent of the inspection. The pre-purchase inspection was never intended to be as comprehensive as the post-award tear down inspection. The tear down inspection would enable plaintiff physically to take apart various structures on the aircraft to discover latent problems. A tear down inspection could not be completed until after an aircraft was chosen, approved, purchased, and moved to WVAC, because, prior thereto, the candidate aircraft did not belong to either the Government or plaintiff. Instead, plaintiff would be choosing SD3-60 aircraft owned by other airline companies, which were not amenable to allowing plaintiff free license to tear apart their aircraft. The pre-purchase inspection, therefore, was a more limited process.

A certain amount of cost uncertainty could not be alleviated by the built-in quality procedures of the pre-purchase inspection, but the requisite tear down inspection – an activity that occurred after the aircraft purchase – was intended to identify all required repairs, including those that were not revealed through the pre-purchase inspection. As such repairs would be necessary for certification and air-worthiness, funding had to be available, and thus came the concept of "over and above."

The Over and Aboves (the "O&As") were to become a separately funded part of the contract to cover the costs for these unanticipated repairs, 17/ which would be subject to ATCOM's approval on a case-by-case basis. Although neither party expected a large amount of O&As, plaintiff had a standing objection, throughout the proposal period and up until award, about the use of a ceiling price for the O&As.

Mr. Mead memorialized his early thoughts on O&As into a November 18, 1992 Memorandum for Record reflecting "Contracting Officer's Determinations, Solicitation DAAJ09-92-R-0819, C-23C Remanufacture[,]" as follows:

> [Contract Line Item Number ("CLIN")] 0001, which is for SD3-60 aircraft purchase, will be reimbursed at cost. The Government estimates 30 percent of contract dollars will go to the SD3-60 purchase. The contractor will be reimbursed strictly at the bill of sale price after he has purchased the SD3-60 aircraft. In accordance with FAR [§] 16.301-3, the Government has determined:

17/ O&As were not intended to fund all repairs discovered only through the tear down inspection. Certain categories of repairs were funded as part of the fixed-price proposal for the modification of each particular aircraft. Any repairs not falling within that particular provision of the contract were considered O&As.

a. The contractor's accounting system is adequate for determining costs applicable to this contract. . . .

b. Appropriate Government surveillance during performance will provide reasonable assurance that efficient methods and effective cost controls are used by requiring and approving an on-site, pre-purchase inspection before the contractor purchases the SD3-60.

. . . .

The over and above work, CLIN 0003, will have time-and-material like features because it is not possible at the time of award to estimate accurately the extent of the repair work or to anticipate costs with any reasonable degree of confidence. The Government estimates over and above modifications will be 20 percent of contract dollars. For this reason, the PCO [Procurement Contracting Officer] has determined an over and above CLIN with time-and-material like features is the only suitable choice. (FAR [§] 16.601(C))[.] This CLIN will also have a funding limitation.

5. Plaintiff's approach to its proposal

Plaintiff formally responded to the January 13, 1993 Request for Proposal on February 22, 1993 (later updated May 24, 1993) with a two-part proposal: part 1, plaintiff's technical response, and part 2, the cost proposal. The technical proposal described how the work would be performed by each major participant and how plaintiff would manage the task. It also included, as an attachment, the WBS, which corresponded to the elements of the solicitation SOW and listed which participant had responsibility for each particular WBS item.

The cost proposal included separated submissions from the main subcontractors, including WVAC and de Havilland, 18/ along with a summary of all costs. It was lengthier than the technical proposal because it included detailed cost/pricing estimates for each WBS

18/ Other major subcontractors included Laurel Technologies, which provided looms, or electrical cables. Lockheed did the actual nacelle (nave or enclosed shelter for engine) modification. Some original equipment manufacturers also were involved, including Pratt & Whitney, which upgraded the engines, and CF Taylor in England, which upgraded the tanks.

item where practicable; lesser WBS items were incorporated into larger ones for purposes of the cost proposal. The bulk of the cost proposal included itemized cost printouts per WBS item, including labor and material, and further subdivision, profit, and G&A. It also included project team costs, including wages and travel.

As noted above, characterizing the issuance of the formal RFP in January 1993 as the beginning of plaintiff's proposal efforts would be misleading. Plaintiff was substantially involved in formulating its proposal through its collaboration on the SOW and the WBS. It becomes more of an exercise in semantics to identify a particular date on which SOW or WBS development became a "proposal development." The lobbying efforts by Shorts Inc., led by Mr. Brooks, the early relationship with WVAC, and the rough order of magnitude work in Belfast – all proceeding in the early 1990s in conjunction with the SOW and WBS efforts – further cloud a distinction.

1) Plaintiff's pre-proposal strategy

Outside of plaintiff's involvement in the creation of the SOW and the WBS, plaintiff's role in its proposal development was primarily managerial. Because WVAC would perform all the actual work on the donor aircraft, plaintiff and WVAC generated a steady flow of written communication and dialogue before and after the January 1993 RFP.

WVAC's involvement as the U.S. production facility traces at least to June 1990. The January 9, 1991 C-23C Preliminary Business Plan states that WVAC "[has] been involved in the planning for the [C-23B+] since June, 1990[,] and to date ha[s] invested considerable time and money in development of the program. A preliminary Work Breakdown Structure has been defined by WVAC in accordance with the Type Specification." The individual key to plaintiff's relationship with WVAC was Mr. Brooks of Shorts Inc., who took the lead. By a letter dated December 23, 1991, Mr. Brooks corresponded with Jeffrey K. Compton, WVAC's President, about establishing a "teaming agreement" with WVAC by January 1992, an arrangement that the Preliminary Business Plan had contemplated in 1990. The "teaming agreement" between plaintiff and WVAC was a letter of understanding, and it established an "exclusivity arrangement," which, as discussed above, required plaintiff to use WVAC if plaintiff received the contemplated contract.

After WVAC representatives visited Belfast, plaintiff sent Cathryn Crone Gilmore, Contract Manager – responsible for scheduling and otherwise accomplishing the tasks set out by the production engineers (called methods engineers) – and Alan Coey, the Belfast Contract Manager for the C-23B+, to visit WVAC on November 19 and 20, 1990. WVAC at that time was just beginning its business and still recruiting labor. As recorded by a draft visit report, DX 1044, plaintiff recognized that WVAC's youth created a risk, but Ms.

Gilmore and Mr. Coey concluded that this involved merely the issue of "'when' will they be ready rather than 'will' they ever be ready." They agreed at that time that plaintiff would be required to provide on-site personnel, including methods and production staff, and recognized the need for further discussions regarding the assignment of responsibility:

> The question of who is responsible for what will require further discussion as WVAC wanted Service Bulletins plus kits [19/] and they would do all the work on the aircraft. [Plaintiff] advised that they could not agree to this as it would be our intention to do all the "engineering" work only and maybe supply the Inward/Outward Passenger Doors, Rear Ramp Door complete and [] Engines[.]

Mr. Heaton, who had overall responsibility for assessing WVAC, was fully cognizant of these risks. He admitted that, "had the contract work that subsequently was placed [at WVAC] been required to be placed [initially,] the work would not have gone in." Heaton I Dep. at 51. Plaintiff was impressed that WVAC hired R. Darryl Devitt as the Chief Operating Officer, who had worked at Fields of Canada, a company that had performed "significant modification" on plaintiff's aircraft. Id. at 105. The background and justification of other personnel at WVAC, including David P. Long, who became President of WVAC, and Mr. Bowyer, caused plaintiff to conclude that while WVAC was inexperienced, it was managed competently. 20/

Although Mr. Heaton did not have detailed knowledge of the ongoing SOW deliberations, he considered that effort to be performed at Belfast, not the SOW per se, would define WVAC's tasks: an "interpretation of [plaintiff's] designers, production engineers . . . of what would be necessary to achieve the end objective of the SOW, . . ." Heaton I Dep. at 64. And that implied "significant engineering work." Id. at 32; see also id. at 18.

The Preliminary Business Plan dated January 9, 1991, generated when the project contemplated conversion of SD3-30s, for which WVAC had performed maintenance,

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19/ Kits are pre-packaged parts with instructions. "Kitting," or creating a "kit," involves a work package that contains the parts needed to accomplish a particular task. Kitting has two aspects: the list of parts needed to do the task, created by methods engineers, and the actual parts. In Mr. Nesbitt's opinion, a "kitting sheet" refers to the list of parts. Tr. at 856-57.

20/ Mr. Devitt left WVAC in mid-1992, fueling plaintiff's concerns over WVAC – so much so that Mr. Heaton described it as "terrible" and "serious." Heaton I Dep. at 107. "[T]he loss of Devitt was a problem for us." Id. at 108.

acknowledged that WVAC was "recently opened" as an "FAA certified overhaul and repair center." The risk involved in manufacturing was assessed as moderate, based upon "potentially excessive learning curves and by virtue of the startup nature of WVAC."

Once the teaming agreement with WVAC was in place, and in light of plaintiff's cognizance of the risks associated with WVAC, plaintiff during 1992 made a series of visits to WVAC. WVAC hosted one of these meetings in March 1992. Representing WVAC were Mr. Long, WVAC Program Manager; Mr. Devitt, WVAC's Vice President and General Manager; and Mr. Compton, WVAC's President. Representing Shorts Inc. were Mr. Brooks and Michael S. Halligan, Program Manager for the C-23B+; and representing Belfast was Mr. Heaton, the Director of New Programmes who was in charge of evaluating WVAC. The presentation included estimates and a schedule, showing anticipated contract award on May 1, 1993. Aircraft delivery was to be made between February 1995 and November 1996 based on that award date.

During mid-to-late 1992 while SOW deliberations were ongoing in St. Louis and Belfast, plaintiff began actively to assist WVAC with its own proposal. Mr. Bowyer, WVAC's Chief Engineer, during the pre-proposal period of 1992, met often with plaintiff's personnel, both in Belfast and at WVAC. Plaintiff sent technical specialists on several occasions during 1992 to WVAC to help Mr. Bowyer with preparing WVAC's proposal. Plaintiff also provided WVAC with other sources of information, such as engineering drawings, technical manuals, and the Illustrated Parts Catalog (the "IPC") for both the C-23B and the SD3-60 aircraft – the two predecessor aircraft. 21/ WVAC also spoke with plaintiff's design engineers, such as Mr. Stripe and "Bobby" Downie – an infamous name as events unfolded – but the information obtained consisted of only the word pictures from the preliminary concept phase, high-level design engineering ideas.

Plaintiff also invited Mr. Bowyer to visit Belfast in September and October 1992, when he met Messrs. Stripe and Downie of the Design Engineering Department; Patrick N. Cowan, Manager, Design Liason Team; and George Cather, Director of Engineering, Belfast. These coordinated efforts implicated technical and important engineering decisions about, for example, where to cut the aircraft to remove 36 inches of the fuselage. These decisions were WVAC's to make, as part of what would become its proposal, but they were taken with full knowledge and approval by plaintiff.

21/ There was no illustrated parts catalogue for the C-23B+ at the time because it could not be produced until the completion of detail design drawings after award.

Mr. Bowyer sent an October 1, 1992 fax to Mr. Long, then serving as plaintiff's C-23B+ Project Manager, to update him on WVAC's planning efforts since his trip to Belfast. Mr. Bowyer wrote that he was "happy to report" reductions in manpower estimates, through reassessments of learning curve estimates – the implication of which will be discussed – and a decision to flatten the learning curve at the tenth aircraft:

> This model is based on our management's experience in other heavy structural mod programs. Such behaviour is typical for small production runs in a modification environment. This is because there are fewer increasing economies of scale with this sort of project than for the large new production programs that the learning curve theory is based on.

During November 1992 plaintiff sent a team to WVAC for another pre-proposal meeting held from November 21-24, 1992. WVAC had been working extensively on its proposal, and plaintiff wanted to review the proposal thoroughly against a draft RFP in order to ensure that WVAC would be ready to respond when the formal RFP was issued in January 1993.

2) Plaintiff's approach to design engineering, methods engineering and scheduling

All pre-proposal activities (all work done up until the issuance of the formal RFP in January 1993), are crucial to plaintiff's approach to its proposal because they inform the three pertinent aspects of the proposal: (1) the design engineering – what plaintiff was going to do; (2) the methods engineering – how plaintiff was going to do it; and (3) the scheduling – when it would be done.

I. Design engineering

One critical aspect of plaintiff's proposal is that the SOW provided that the contractor would do the design engineering work. Thus, once the contract was awarded, plaintiff would produce what are referred to as "detail design drawings," the ultimate product of a design engineer, which would detail the modifications. Two types of detail design drawings were involved: One is a detail drawing that shows a part; the other is a general assembly that shows that part being assembled.

While plaintiff was not funded to do any detail design drawings prior to award, some design engineering activities were completed before September 30, 1993. Plaintiff had to generate design concepts in order to formulate realistic technical and price proposals. Plaintiff's design engineers worked from an early stage on what plaintiff calls "concept

designs." The concept design stage involves informal work by design engineers, whose output usually included verbal descriptions of anticipated design drawings and "word pictures," as termed by John W. Ballard, Senior Industrial Engineer for plaintiff, who was the principal Methods (production) Engineer on the project. This is not detail design work; plaintiff did not produce detail design drawings prior to award.

The reliability of design work at this stage was low, because design engineers were conceptualizing without vital engineering information necessary to produce actual detail design drawings. Mr. Maguire, plaintiff's Commercial Manager who finalized the proposal with WVAC and negotiated with ATCOM, explained the role of the design process during contract performance. Work on a detail design drawing does not commence until after a contract is awarded.

Mr. Stripe was in charge of structural design for the C-23B+ project. He related that the actual design began with "scheming" of a local area that would be impacted – for example, the fuselage – and then the designer would extract the major assemblies, go on to the subassemblies, and do the details. Stripe Dep. ¶ 136. The specific local areas would be assigned to different designers. The drawings for this project took approximately forty weeks and work issued incrementally. Mr. Stripe reported to Tom Mansfield, the Engineering Project Manager, who was responsible for drawing up the design engineering budget. Mr. Mansfield described the pre-contract design work as an "assessment of task[,] . . . a written description of the structural changes, . . . a few sketches done, how we felt we would tackle the job." Deposition of Tom Mansfield, Aug. 3, 2000, at 10. "Proper engineering drawings" were produced only after contract award. Id. at. 23. More significantly, he testified: "The C-23B+, particularly on the structural engineering, we did have what we called a small design build team which were actually planners in the office, so that they knew what was going on and gave advice on the practicality of what the design engineering people were proposing." Id. at 12-13.

A detail design drawing cannot be released until review by the Stress Engineering Department. Stress engineers perform stress calculations, which take the modifications proposed by a detail design drawing and calculate the distribution of loads on the structure of the aircraft. According to Mr. Nesbitt, Stress Engineering is one of several departments providing input into the creation of detail design drawings; others included weights, aerodynamics, and Methods Engineering. All departments would sign off on the drawings.

During the early stages of the pre-proposal period, plaintiff involved design engineers to do "feasibility studies." Tr. at 932. These studies, in turn, assisted ATCOM in the creation of the SOW. Design engineers provided the Strategic Planning Committee with the

comparative assessments of using the SD3-30 and SD3-60 aircraft for the conversion. Such feasibility studies were well within the concept design phase.

Not only was plaintiff not funded to include the detail design activities incident to submitting its proposals, but another aspect of the preaward period implicitly impacted the nature of plaintiff's limited, first-stage conceptual design engineering. Plaintiff had experience with modifying its own aircraft, although plaintiff's witnesses were quick to qualify the modifications as minor. Design Engineer Stripe made the point: "Short Brothers are basically producers of new aircraft. It didn't have a mod. squad or whatever for refurbishment on that type of scale." Stripe Dep. ¶ 111. Throughout the pre-proposal period, and even during the actual proposal process, plaintiff planned to subcontract the design engineering activities to what was referred to as a "design house." The Strategic Planning Committee meeting on March 9, 1992, during which the SD3-30 –versus– SD3-60 discussion occurred, also addressed the issue of resources for the project. At that time plaintiff concluded that it would not be able to complete the design activity because those resources would be diverted to working on a Lear jet program discussed by Mr. Maguire. The Lear program date eventually slipped, but it had been expected to conflict with the C-23B+ program.

Because of the limited resources available for design work, plaintiff developed a SOW for the design house. This SOW would have required the design house to do all "design and development of all the modifications" required for the conversion, but plaintiff would have maintained "overall control of that design even though it was being operated by a subcontractor." Crawley Dep. ¶¶ 261, 263. It contemplated a Special or Supplementary Type Certificate ("STC") approach, which is used extensively in the United States and is a method of obtaining certification for a modified aircraft or for a modification to an aircraft. Id. ¶ 279; Heaton I Dep. at 18-19. The scope provision of this SOW provided, in pertinent part:

> This [SOW] covers the provision of engineering and design services required of the contractor on behalf of [plaintiff].
>
> . . . .
>
> The scope of this SOW is to prepare a design and engineering package to modify the aircraft at a designated plant in the USA; to certify the modified aircraft to FAR Part 25/FAR Part 36 through a supplemental type certificate process; and to provide any necessary on site engineering design support throughout the life of the manufacturing/modification programme.

While several subcontractors were under consideration, WVAC expressed interest in undertaking this work, but not until after September 1992. Apparently, WVAC – and this occurred well into work on the WBS – was proposing to be the design house and submitted a preliminary proposal to plaintiff by fax on November 13, 1992.

Although the date on which plaintiff decided to do the design work in-house is not certain, WVAC was in limbo on its design house proposal until after it submitted its formal technical and cost proposal for its other work in April 1993. Ultimately, plaintiff abandoned using a design house to produce the detail design work for several reasons, including a general dissatisfaction with the potential subcontractors' capability of meeting the exact design criteria. According to Mr. Heaton, using an "out-house" would be more costly. Heaton I Dep. at 28. And, then, plaintiff had to keep its own team of skilled designers engaged or risk losing them to competition. Plaintiff already had established a good working relationship with the FAA and the Civil Aviation Authority (the U.K.'s equivalent to the FAA) to obtain necessary certification; delegating control over the certification process to a design house was perceived as more risky. Finally, plaintiff did not have the constraints on its resources as it initially had thought because the Leer jet program was moved. For these reasons, during early 1993, plaintiff opted against a design house.

ii. Methods engineering

Methods engineering is an umbrella term, and different organizations use it differently. Mr. McCoy provided a general explanation of the process. In general, it refers to planning. A methods engineer takes the detail design drawings, and the notes on those drawings, and translates that product into instructions for the mechanics on the shop floor or the fabrication workers creating a particular part. Many organizations also consider scheduling among the responsibilities of their methods engineering department; some have separate scheduling departments. However the methods engineering is organized, its use in the industry is crucial; Mr. Ballard, a justifiably proud methods engineer, declared that "[m]ethods engineering is vital to the aerospace industry. It's the basis of which the aerospace industry conducts its business." Tr. at 2411.

While methods engineering is an integral part of any type of manufacturing or modification of an aircraft or part, the question of who discharges the responsibility depends entirely on the project. Moreover, different types of projects are undertaken in the aerospace industry, the nature of which would imply to a proposing contractor various levels of methods requirements. At the level of least involvement, a standard service bulletin usually would require the department that actually will incorporate the service bulletin into the aircraft to expect to have all methods engineering set out as part of the engineering package. Thus, a service bulletin would be used if, for example, an aircraft manufacturer conducting

a service inspection discovers a particular problem with a part on the aircraft. The manufacturer might develop a service bulletin to fix the problem, which would include all the engineering – design, methods, and even the parts – required to accomplish the particular solution, and then send out these service bulletins to the users of the aircraft. A contractor performing service bulletin work therefore would not include significant methods planning in its cost proposal on this type of pre-packaged work.

The other extreme would be a new manufacture. After the design engineering drawings were issued, the contractor would anticipate the need for resources to create all of the instructions for the actual shop-floor mechanics to complete each task. Plaintiff, as an aircraft manufacturer, had a system in place for its methods engineers. They would create Engineering Process Records ("EPRs"), which were the actual instruction sheets with a list of parts and any information that a mechanic might need; 22/ the more EPRs, the larger the project. WVAC's version of an EPR was called a Work Procedure Sheet ("WPS"), and plaintiff adopted the term "WPS" to avoid confusion in this project.

The methods engineering product anticipated in this project was to be the final and lowest level of detailed task descriptions. From the more general to the most specific levels were the SOW, the WBS, and finally the WPS's. A methods engineer's role did not end after creation of a WPS. Methods personnel were also required on the shop floor during performance. They would interface with the mechanics, address problems, revise WPS's, and improve tooling.

As the detail design phase of the project was to proceed after award, plaintiff did not perform any methods engineering during the pre-proposal and proposal periods. Just like the detail design work, however, methods engineers were involved during proposal development, and the extent of their involvement became a major issue at trial.

It is plaintiff's general business practice to assign methods engineers with significant responsibility in preparing a bid. The construction of the overall Bill of Materials (the "BOM") (including each material item that was used on the contract), task planning, quantifying the project in terms of hours, critical path, labor profiles, shop floor plan layout, tooling, amount of methods engineering support required during performance, and production cycle are all under purview of methods engineers.

22/ EPR's, or WPS's, were also the official records of task completion used by FAA and CAA authorities for certification of work purposes.

Methods Engineering had input into plaintiff's development of the SOW and plaintiff's work on the WBS. Methods engineers assessed the feasibility of what was being proposed by design engineers doing concept-phase work.

Plaintiff's plan to use a design house impacted the input provided by Methods Engineering during the pre-proposal stage. Although the witnesses referred to farming out the design work only, the term is somewhat misleading because it implies that the design house did only that – the design. The documents are more descriptive: The design house SOW refers to its scope as requiring the preparation of both "a design and engineering package." Furthermore, WVAC's November 13, 1992 fax to plaintiff with its proposal to serve as the design house states that it would create an "engineering program office" devoted to this work, and "[p]roduction planning and scheduling would be an important part of the program office effort. 2 planners would work on this full time." Production planning and scheduling are not activities of a design engineer, but, rather, come under methods engineering. While WVAC was not selected as the design house, WVAC did include some methods engineering in its proposal for all the other work.

iii. Scheduling

A fundamental aspect of government procurement contracts is the delivery requirements. The scheduling of the tasks required to complete the project normally serves to meet these delivery requirements, and this contract was no exception. Plaintiff approached its proposal by creating a schedule listing aircraft delivery dates to meet what all of its witnesses insisted were ATCOM's requirements. In fact, the evidence supports a finding that the period for completion of ten aircraft – variously thirty or thirty-five months – was a working assumption from the outset of plaintiff's interest in pursuing a contract award for the project – well before production ceased on the C-23B. A March 7, 1991 presentation at WVAC for plaintiff (George Cather, General Manager, Engineering and Consumer Support; Mr. Coey, Contract Manager; and Mr. Maguire, Commercial Manager, Aircraft Division) reflects completion of ten aircraft in a thirty-month period, with aircraft 1 starting six months ahead of aircraft 2, allowing eleven months to complete aircraft 1. The evidence revealed that plaintiff wanted to continue production to meet the Guard's requirements, although it could not justify continued manufacture. As Mr. Stripe put it:

> We had designed and built the B and we hoped very much that US military would take more Bs because we thought it was a very good aircraft, but my understanding is that they were not prepared to order sufficient number to render it viable to put it back into production. So there were discussions at the time as to if it was possible to supply an equivalent aircraft using or adapting existing aircraft.

Stripe Dep. ¶ 81.

When plaintiff assessed scheduling, it had to take into account all requirements of the project, meaning that it was required to estimate the necessary time for producing the detail design drawings, inducting donor aircraft, implementing methods engineering (*i.e.*, WPS production), performing the actual conversion, and testing all aircraft for flight worthiness. Plaintiff had to consider the floor plan, the number of aircraft that could be worked on at WVAC, the type of work that could be accomplished at any given time, part procurement, etc. These are all inputs into the critical path, which Mr. McCoy defined, in the context of this project, as "the quickest time in duration that any company could perform the remanufacture of 28 SD3-60's into 28 C-23B+ aircraft." Tr. at 1840.

Because WVAC was to submit a proposal for the modification work, primary responsibility for creating a schedule to meet delivery requirements fell to WVAC, as will be discussed.

3) Plaintiff's proposal period strategy

Formally, plaintiff formed a proposal team by December 1992, but the record shows that this allocation occurred after Mr. Mead, the ATCOM Contracting Officer, had outlined the contours of the contract to plaintiff in January 1992. The events that led up to the formation of the team are part of the pre-proposal period. This encompassed a significant amount of work well before the issuance of the January 1993 RFP, all of which was driven by ATCOM's procurement time parameters. 23/

The proposal team consisted of key individuals representing all functional disciplines whose input was necessary to develop the technical and cost proposals: the Design Engineering Department, the Methods Engineering Department, Operations, the Program Office, PALS, and Commercial Estimating. Mr. Maguire was the designated Commercial Manager responsible for finalizing plaintiff's proposal and the subcontractors' proposals, who had overall responsibility for the team. Mr. McCoy served as coordinator. Mr. Heaton, the Director of New Programmes, assisted generally in procuring the contract. Ivan Patterson represented the Methods Engineering Department; Mr. Mansfield, Design Engineering; and Morris Forrester, Commercial Estimating. The proposal team met on a daily basis after issuance of the RFP.

23/ According to Mr. Maguire, the contract had to be awarded by September of 1993, or funding for the first ten aircraft would be lost.

On December 23, 1992, WVAC submitted to plaintiff its first draft proposal, and immediately correspondence was exchanged between WVAC and plaintiff addressing issues pointed out by plaintiff. With draft proposals from WVAC and de Havilland in hand, and the formal RFP issued, the more formal proposal work begin after January 1993.

Plaintiff distributed WVAC's proposal to all functional disciplines for evaluation, and Messrs. Maguire and Forrester traveled to WVAC to perform an audit. Plaintiff's Vice President for Aircraft, Mr. Brundle deemed the proposal "very impressive" at the time. Tr. at 4018. However, one issue that plaintiff identified at the outset was that it could not identify exactly where WVAC's methods engineering costs were allocated. WVAC responded by telling Belfast that its methods planning was included as an overhead charge. Plaintiff asked that WVAC separate out the cost, so that it would pass ATCOM's auditing, to take place in the near future.

More generally, plaintiff had reviewed the proposal and found some areas where it considered that WVAC proposed too many labor hours, while other areas included insufficient hours. The notes of a wrap-up meeting, dated February 25, 1993, illustrate which particular WBS item had too many or too few hours, in addition to other comments on the WVAC proposal. In response to these comments, WVAC revised its proposal throughout the first part of 1993, until it reached final form. The cost proposal was dated April 2, 1993, and the technical proposal was dated April 4, 1993.

Mr. McCoy drafted a report on a trip visit to WVAC and de Havilland from February 22 - March 3, 1993. This report, dated March 8, 1993, listed what Mr. McCoy recorded as areas that "need[ed] to be addressed." His concerns included the first article plan, which Mr. McCoy felt was "resource driven as opposed to schedule [driven]," a lack of detailed production planning, "shallow" quality assurance, "very weak" process planning, and a total lack of any stores procedures. 24/ He concluded that "WVAC, as yet, has not displayed an acceptable level of competence required to manage a project such as the [C-23B+]."

Plaintiff was also assisting WVAC in preparing for its presentations to ATCOM. On March 2, 1993, Mr. Heaton faxed to WVAC an agenda for an ATCOM. Mr. Heaton advised WVAC that "[t]he strong points that must and can be won are schedule reliability and quality of the facility." Mr. Heaton wanted WVAC to explain to ATCOM why plaintiff chose WVAC, and he listed several reasons, including "great facility – the best;" the extensive planning WVAC did for the SD3-30; "Shorts took the decision on WVAC a year ago –

24/ The term "stores" refers to parts; stores procedures include part identification, bin locations, and nonconformance procedures.

needed involvement of the end player throughout;" "WVAC willing to invest in making the operation truly effective;" "politics, say it but don't dwell on it;" and an expectation that "WVAC will be a major force in the regionals[.]" 25/

Plaintiff internally conducted a thorough risk assessment of the WVAC proposal. Risk is discussed in a preliminary C-23C Finance Committee Pack, sent by Mr. Maguire for review by the Finance Committee on February 3, 1993, which presented the risk level on various items, including: engineering - moderate, manufacturing - moderate, procurement - low, aircraft purchase - low, and O&A activity - low/moderate. The following is an excerpt from the engineering and manufacturing risk evaluations:

> [ENGINEERING:] The design task to co[n]vert a SD360 to a C-23C is straight forward. Prior to official release of the solicitation, ATCOM with Shorts assistance have established a [SOW] and thus the requirement is well understood. However, because pre-owned aircraft will be used with possible high life components and differing design standards the task is more difficult. . . . The ability to use low usage aircraft with a high design standard will significantly reduce our risk.
>
> Shorts resource capability to design/production engineer for a major modification program will affect the level of risk. The more we can utilise experienced Shorts personnel the lower the risk.
>
> . . . .
>
> [MANUFACTURING:] WVAC – is particularly inexperienced, in what will be the largest modification program for this young company established only 4 years ago. To minimise the risk Shorts will place suitable experienced personnel at the sub-contractor[']s facilities to provide immediate on site support.

As to "Contract Definitization," this Finance Committee Pack advised a low risk rating, noting specifically that "as this is an uncompetitive contract with no commitment taken by Shorts until definitization is complete, we have no obligation to accept unreasonable risk."

25/ Mr. Long wrote back to plaintiff on March 17, 1993, after the presentation to ATCOM, stating that the presentation went "very well" and that Lt. Col. Randall G. Oliver of ATCOM gave WVAC positive feedback. He also wrote that "[h]e may not know what we know, but the objective was to give him some comfort and that was accomplished."

With the final WVAC proposal in hand, plaintiff formally submitted its revised proposal to ATCOM on May 24, 1993. That prompted the should-cost audits by ATCOM, which will be discussed. However, an important internal development had taken place. Plaintiff had made a shift of responsibility over the project. Up until April 1993, engineers and other personnel were loaned to the business development team, the proposal team, and a dedicated pre-proposal team to work on the C-23B+ project. As documented by a memorandum dated April 7, 1993, plaintiff held an "away day" on March 30, 1993, an off-site business retreat, and formally allocated responsibility for the project to the PALS division, whose representatives in attendance included John C. Nesbitt, a 33-year veteran with plaintiff, who was the C-23B+ Program Manager from June 1993-October 1998, and who eventually took over the project as General Manager at WVAC from October 1994 to December 1995.

Witnesses could not recall when exactly plaintiff determined to assign this project to PALS, but the decision was consistent with plaintiff's understanding of the contract's scope during this period. PALS was the support organization for all of plaintiff's other commercial aircraft programs, and thus it was considered the obvious choice for a modification/refurbishment project. The C-23B+ could have been placed in the Operations Division, which, according to Mr. Maguire, would have been more suited for a remanufacturing effort as the expertise of Operations "would be more akin to an operations environment." Tr. at 670.

In July 1993 plaintiff sent to WVAC Mr. McCoy – plaintiff's principal witness at trial – who served as General Manager at WVAC from August 1993 until Mr. Nesbitt assumed that position, and who was elevated to Operations Manager from November 1994 through June 1996, and Mr. Ballard, the experienced methods engineer with extensive knowledge covering the production of all SD3-series aircraft, including the SD3-60 and the C-23B. Mr. McCoy received a full presentation from WVAC on the proposal, including review of the WBS and the SOW. He toured the facility, assessed the size and skill level of the labor force, and left with a conclusion that WVAC was capable of meeting the scope of work as laid out in the WBS and the SOW. (At that point, WVAC still was performing maintenance on SD3-30 and SD3-60 aircraft at the facility.) Mr. Ballard observed what he described as a "well-motivated" workforce. Tr. at 2468. He also met Phil Pulliam, a methods engineer at WVAC, whom Mr. Ballard found experienced and competent. Mr. Ballard did some trouble-shooting and offered advice to WVAC on issues like potential problems with lack of storage. When he returned to WVAC in November 1993, Mr. Ballard learned that many of his suggestions had been followed.

Mr. Ballard, however, did not review the proposal during the July 1993 visit; he understood that review had been performed at Belfast. He also did not check with the design

engineers to see if the proposal was consistent with their preliminary concepts, which was not within his purview. Although WVAC did inform Mr. Ballard that it included two planners, the matter was not discussed in depth. Mr. Ballard was not there to, as he put it, "instruct them on how to do their own work. My role was to give them advice and support and information on the aircraft." Tr. at 2702. Furthermore, Mr. Ballard, like WVAC, had the impression at the time that Belfast would issue service bulletins. How the design engineering was to be executed and transferred to WVAC was not something that he monitored because it "was not [his] role at the time." Id. at 2713.

Plaintiff's proposal development process included independent review of the proposal team by "the Red Team," appointed by Mr. Brundle. The next level of review was plaintiff's Finance Committee and finally Bombardier. The Red Team review took place during January 1993, prior to WVAC's submission of a final draft of its proposal in April. Russell W. McFadden, General Manager of Composites for Bombardier and former Director of Manufacturing Engineering, who sat on the Red Team, had reviewed the WBS prior to the Red Team evaluation, and attended the proposal review meeting. The Red Team approved the proposal with a risk rating of lower to moderate, which, Mr. McFadden testified was because "[i]t was considered at that time as a relatively straightforward modification program." Tr. at 3382.

6. WVAC's approach to its proposal

WVAC's proposal team included Mr. Devitt, the General Manager of the facility, responsible for the overall proposal; Greg Baer, Manager, Special Projects; and Mr. Bowyer. Mr. Bowyer, WVAC's Chief Engineer, did much of the work in drafting WVAC's proposal, with the assistance provided by plaintiff discussed above. He worked most closely, however, with Mr. Long, plaintiff's North American Coordinator and C-23B+ Project Manager, who became President of WVAC.

WVAC's proposal itself, like plaintiff's, consisted of cost and technical proposals. It was unusually detailed, and WVAC had several reasons for creating such a comprehensive proposal, according to Mr. Bowyer. First, the size of the project was large for WVAC, so, without experience in a project of this magnitude, WVAC was forced to estimate the cost in order properly to submit a competent proposal. Second, WVAC knew from the beginning that it would be audited by both plaintiff and ATCOM, so it wanted to have as much backup data as possible. Third, WVAC wanted to record the mutually understood scope of work in order to provide grounds for negotiation should the scope of work change.

WVAC used the Symix System ("Symix"), which tracks labor and material transactions, to produce its cost proposal. WVAC personnel coded particular tasks and input

labor hour estimates into the computer program, which produced the tabulation and presentation. Based on an estimated standards handbook, WVAC assigned hours for a particular task, which was quite detailed, down to the level of the time required to do riveting.

In order to secure a subcontract, WVAC had to assure both plaintiff and ATCOM that WVAC's relative inexperience with a project of this scale could be overcome. WVAC, which already had various FAA-quality procedures in place, was required to develop procedures sufficient to comply with applicable Military Specifications, including, for example, quality requirements and manuals for handling government-furnished equipment. Also, because the job was going to be so large, WVAC had to expand its stock room 26/ and hire more personnel.

The early 1990s was not only the time period during which WVAC was building to prepare for this contract; it was also the beginning of the organization. WVAC had hired outside consultants to develop five- and ten-year plans for the company, with a particular emphasis on ramping up to prepare for a government contract. To that end, The Federal Market Group, a consultant organization, in association with Toothman Rice and Company, WVAC's accountants, prepared a document dated September 1992 entitled "Executive Summary." This consultant report states that "[t]here are currently two major initiatives that can 'make or break' WVAC; the Shorts C-23C program and the California Microwave DAS11-7 program. WVAC cannot perform profitably on either contract at this point." The report recommends hiring an Operations Manager, Sales Manager, Program/Project Manager(s), Contract Administrator, and Government Cost Accounting specialist. It identifies several key needs within internal support systems necessary to obtain a government contract, including planning, cost accounting, purchasing, quality control, and configuration management. Notably, the report indicates that the planning function and configuration management did not exist. WVAC retained William Pentz, who had extensive experience in military contracting, first as a consultant, then as a WVAC employee, to review its proposal on the C-23B+ project.

26/ At some unspecified point in time, WVAC required so much more stock room that it had to purchase a temporary building manufactured by Sprung. The temporary building was covered in fabric and constructed with an arch over the top, and painted white. As plaintiff's witness Mr. Bowyer described, "when the whole thing is done, it bears an unfortunate resemblance to a circus tent, and the joke around the plant was the place was finally looking like a three-ring circus." Tr. at 2185.

Early on, WVAC communicated primarily with Shorts Inc. regarding the program, including the goal of obtaining a commitment from plaintiff that it would receive the work. With that philosophy, WVAC also was keen on making quality presentations to plaintiff in order to procure the subcontract. For example, a November 10, 1990 memorandum from Mr. Long (who then was in Belfast) to Mr. Devitt preceded a trip of Belfast representatives to WVAC. Mr. Long wrote, "Although the trip plans are not yet firm I think we should begin planning a GOOD demonstration of the WVAC potential for these visitors." He suggests presentation of "any other data that show WVAC is ready willing and able to gear up for a program of this size." The presentation should also, according to Mr. Long's memorandum, contain a "[d]emonstration of a commitment (even if not yet fully made) by WVAC to provide whatever resources are necessary to make the proposed project successful." 27/

Throughout the period leading up to award, WVAC, with Mr. Bowyer as point man, was in ongoing communication with plaintiff about technical information needed to define the tasks required to complete the work set out in the WBS. Mr. Bowyer was the technical person, a highly qualified FAA "designated engineering representative" or DER, licensed to sign off on work for the FAA. His input was on structural aspects; Mr. Baer, WVAC's Manager of Special Projects, handled avionics and costs. However, in preparing WVAC's bid, Mr. Pentz, WVAC's consultant on the proposal, testified that WVAC had neither the drawing package on the aircraft that was being modified – the SD3-60 – nor the drawing package on the final product – the C-23B+. Mr. Pentz saw his role as helping "these people [WVAC] do what they want to do. They've already made a commitment to bid on it, they were hell bent to do it[.]" Deposition of William H. Pentz, July 6, 2000, at 45. Contrary to Mr. Pentz' testimony, Mr. Bowyer believed that, in addition to visits from Belfast personnel to help with proposal preparation, WVAC "had a lot of technical information," from IPCs for both aircraft, as well as maintenance manuals, and verbal or written "word pictures" from Shorts personnel – what he referred to as "task description or a difference description." Tr. at 2121-22. Nonetheless, Mr. Bowyer understood the concepts to be "pretty preliminary." Tr. at 2123.

The fact that the design engineering drawings would not be issued until after contract award presented risks to WVAC, and Messrs. Pentz and Bowyer acknowledged risks

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27/ Interestingly, attached to this November 10, 1990 memorandum is a milestone chart; the first milestone is "Shorts [Inc.], PLC [Belfast], and WVAC agree on what the finished A/C will look like." The second milestone is "Shorts [Inc.] and WVAC have taken Type Spec[ification] and defined which mod[ifications] will be required for a complete [aircraft]."

concerning "things that might not even be [in the proposal]." Tr. at 2339-40. Instead, because they knew that plaintiff would be conducting a detailed review of WVAC's proposal, Mr. Bowyer took comfort that plaintiff would ensure that congruency existed between WVAC's proposal and what the design engineers planned on doing. With this assumption, Mr. Bowyer never contacted personally plaintiff's Design Engineering and Production departments after WVAC submitted its proposal to confirm that plaintiff had undertaken the review.

Notwithstanding the relationship between WVAC and personnel in Shorts Inc., WVAC was still its own company, and, while WVAC worked closely with plaintiff generally, plaintiff was in charge. For example, Mr. Nesbitt wrote to Mr. Pentz on June 30, 1993, regarding the issue of program reporting and visibility. Mr. Nesbitt, as plaintiff's Program Manager, wanted to ensure proper visibility of performance, but WVAC tugged somewhat on the issue because it did not believe that it should have to do any program reporting to the prime beyond which the contract required. They reached a compromise agreement.

1) Methods engineering

Plaintiff's plan on using a design house to do the design work had an impact on WVAC's proposal development. As discussed above, WVAC had submitted its own proposal to become the design house in November 1992. Mr. Compton, whose name appears as the author of the November 13, 1992 cover fax attached to WVAC's preliminary proposal, 28/ noted that both production planning and scheduling would be a part of the design house proposal.

The extent of production planning, and what everyone understood the term "production planning" to mean, goes to the heart of the dispute over methods engineering. Mr. Bowyer prepared the quotation/estimate attached to the November 13, 1992 fax describing WVAC's design house proposal. It defines the work scope as "engineering design," which is further defined as "a design package [to] define the complete modification." The proposal then identifies what the drawings will describe, and it also identifies that an STC process for obtaining certification would be used. WVAC anticipated that it also would produce "[p]lanning and work order release [and] control." The rough order of measure (the "ROM") pricing includes a cost for "[m]anufacturing planning and schedule tracking." It describes the pricing totality as "[t]his is a ROM cost estimate for design, certification and planning[.]" Mr. Bowyer prepared the attached schedule.

28/ Mr. Bowyer testified that he was the actual author of the document. Tr. at 2313.

The inclusion of production planning in WVAC's design house proposal creates some ambiguity as to the nature of the production planning intended to be part of WVAC's proposal for the actual conversion. It was clear from early on that plaintiff intended WVAC to include production planning in its main proposal, as, for example, the minutes of the November 21 through 24, 1992 C-23B+ pre-proposal meeting at WVAC noted: WVAC would be tasked "to develop the production processes."

Mr. Bowyer, the witness most involved on WVAC's behalf with its proposal, testified that the concept of production planning and processes in the WVAC main proposal was not the same as that in the WVAC design house proposal. Instead, he understood that WVAC was responsible, under the main proposal, to do lower level production planning, which means that WVAC expected plaintiff to provide all the higher level production planning.

> Q. Well, to the best of your recollection, did WVAC intend to do the methods engineering for the modification work in November 1992?
>
> A. Well, let me talk about that. The answer to that is a little complicated, okay. We talk about methods engineers, we talk about planners, we use those terms more or less interchangeably. But like any other specialty, there's grades of people. There are what I would call production planners or planning clerks, who would be down on the shop floor issuing paperwork to record work being accomplished and generally keeping track of the schedule, or is the airplane build at the place where it needs to be. And from that, there's a whole continuum of people that you could perhaps call methods engineers, up to the level of an expert like Mr. Ballard. I think its's fair to say that what was in the WVAC proposal that we called planners was people at the lower level of that, who would be basically taking defined, a defined engineering task, attaching whatever paperwork was necessary to track it in the shop, and then moving it on out to the shop and keeping track of the schedule.

Tr. at 2323-24.

Mr. Bowyer also explained that what he expected from plaintiff in terms of the design package would be "rework drawings, which would provide an adequate description of the changes that needed to be made and not acquire a large amount of methods engineers to reinterpret the drawings in order to be able to write a [WPS]." Tr. at 2368-69. In contrast, the design house proposal contemplated that WVAC would be responsible for the higher level production planning.

When asked about where methods engineering appeared in the WVAC proposal, Mr. Bowyer identified only one person in the cost proposal submitted to plaintiff who was responsible for this type of planning, the "government program planner," who would not be a methods engineer:

> Q. [W]hat was your understanding at the time that you prepared the proposal of what the duties of the government program planner would be?
>
> A. He would be an individual on the shop floor who would be, as part of his duties, he wasn't going to be totally dedicated to the C-23, at least in 1994. He was going to be in charge of coordinating the paperwork that's flowing on the floor, coordinating the schedule tracking and releasing paperwork that is of a pretty simple nature, in terms of records paperwork.
>
> Q. So he's coordinating paperwork in at the time that you prepared the WVAC proposal. Did you expect the government program planner to draft statements of tasks for the workers to perform?
>
> A. If so, they would be simple statements of tasks, such as perform the work shown on drawing so-and-so and then record the performance here.
>
> Q. So when you prepared the WVAC cost proposal, you did not intend the government program planner to be a methods engineer, is that fair?
>
> A. That's correct.

Tr. at 2327-28. 29/

Plaintiff, however, understood that the WVAC proposal did include methods engineering; Mr. McFadden explained: "[W]e knew that WVAC were responsible for the methods engineering at WVAC because it wasn't in Shorts' portion of the contract." Tr. at 3547. Mr. Maguire, plaintiff's Commercial Manager, who finalized the proposals from WVAC, recalled conversing with WVAC after receiving its cost proposal to ensure that WVAC included methods engineering. WVAC was using an external accountant to advise WVAC on its cost collection system. Mr. Maguire testified that WVAC had placed methods

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29/ Mr. Bowyer did note that WVAC had outside consultants make many of the specific personnel allocations in the proposal.

engineering in an overhead account and that Mr. Bowyer informed him that the government program planner was WVAC's methods engineer. 30/ Tr. at 766.

These issues were revisited throughout 1993 and, indeed, up to contract award. Plaintiff sent personnel to WVAC for a meeting on February 9 and 10, 1993, that addressed the issue of unidentified work – work not identified in the SOW or the WBS. WVAC was aware that it was dealing with older aircraft, and thus it communicated to Mr. Heaton that it would only do the work that it described. It is not clear how that issue was resolved, because an April 7, 1993 fax from Mr. Heaton to Mr. Pentz at WVAC refers to the February visit and the discussion on "unidentified work and where this responsibility and costs should fall." Mr. Heaton stated that plaintiff would not accept WVAC's position that plaintiff was to provide additional funding and that WVAC had no responsibility for sustaining the costs.

The dispute over "unidentified work" was part of a larger dispute that began to form after WVAC submitted its final April 2, 1993 proposal. Mr. Bowyer was shocked to learn that plaintiff was going to do the design work itself – that all the design activity would remain with Mr. Stripe's group in Belfast and not be done in North America. Mr. Bowyer described this switch as "the tide has changed," and it created a concern because WVAC's proposal did not allow for a liaison for communications on design. Tr. at 2377. The notes of an internal meeting on May 12, 1993, held by WVAC, reflect WVAC's position:

> WVAC will stand fast on Revision #3 of our Cost Proposal. At the time of Revision #3, it was WVAC's impression that the design and engineering portion of the Program would be carried out at WVAC's facility. WVAC does not include any substantial time for engineering personnel to be in Belfast.

These notes also indicate that "[plaintiff] does not acknowledge the program has changed since original proposal was submitted, they do however acknowledge 'real' verbal changes have been made, but no formal written changes have been requested."

This concern seemed to prompt yet another, even more disconcerting, concern, with WVAC's growing realization that it was going to be responsible for more methods planning than originally anticipated. These concerns were alive even in July 1993, two months before

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30/ Furthermore, the notes of a wrap-up meeting on February 25, 1993, record that "Shorts supplied details [small parts] will not be kitted. WVAC to assess stores manpower requirement and stores systems to cope with large volume of parts." Mr. Haggerty, plaintiff's expert in aircraft remanufacture, testified that this note indicates that plaintiff was anticipating that WVAC was going to be performing the methods engineering.

contract award. WVAC held a "Production Planning Meeting" on July 20, 1993, the notes questioning: "1. Will mod. design include proper considerations for WVAC capabilities? 2. Will timely design information be available to support process engineering/planning?"

2) Scheduling

The testimony of the Mr. Mead, the ATCOM contracting officer in charge of acquisition, was disappointing. His recall was poor. The court did not find credible his recollection that plaintiff set what Mr. Bowyer referred to as the "aggressive" delivery schedule, Tr. at 2328 – to wit, delivery of twenty-eight aircraft within a thirty-six-month period – October 1993 to October 1996. The court has found that the schedule was contemplated so early in the pre-proposal process that it would belie the joint efforts to continue virtually uninterrupted delivery of the C-23B to say, on the other hand, that ATCOM dictated it. However, projected availability of funds always drove the schedule. The evidence is unequivocal that plaintiff proposed to meet it and assign most of the responsibility for scheduling to the subcontractor that would be doing the actual modifications, WVAC.

To create a schedule that involved a major modification effort on aircraft, WVAC had to appreciate and integrate two concepts common in the industry. The first is the learning curve theory, and the second is a "first article plan."

The aerospace industry understands that the time to complete the first aircraft is greater than the time to complete the last aircraft. This premise generates the concept of the "learning curve," which itself is based on the premise that production workers will learn how to do the work progressively more efficiently, thereby decreasing the amount of time to produce each successive unit.

A learning curve is the graphical depiction of a mathematical formula used to plot the time to complete any given unit of production based on what is input into the formula. Along the X-axis of the graph are the units of production, starting from unit 1, and along the Y-axis is the time required for production. This presents as an inverse exponential graph, where the amount of time to complete each successive unit of production decreases at a particular rate, generally leveling off at some point. In theory, learning can continue forever, but often a learning curve will contemplate that at some point, all learning will be achieved. This point, where the slope of the curve is zero, is the "set-point."

The set-point equates to the minimum time, under optimal conditions, for the laborers to make one unit. An early set-point, such as a set-point of ten units (also referred to as T-10), signifies that ten units of production would be completed before all learning would be

achieved. Conversely, a set-point of 100 units, or T-100, would mean that it would not be until the 100th unit of production that all learning finally would be realized.

The learning curve also takes into account the rate of learning. If the rate of learning will not change, the slope of the learning curve is linear: Each successive unit of production reduces its durational needs by the same amount. More common, learning curve theory contemplates that more learning would occur at the beginning than closer to the set-point. Thus, the difference in time required to produce unit 1 versus unit 2 would be more than that for units 2 to 3, decreasing 3 to 4, etc., until the set-point is achieved. In this scenario the time per unit would decrease exponentially. The rate of learning is expressed in terms of percentages: A higher percentage equates to slower learning.

Learning curve analysis was central to WVAC's pricing of the project, according to Mr. Bowyer. It generated the production schedule per aircraft, the first of which was called the "first article." The first article is a particularly important aspect of scheduling, because, like the learning curve, it is an expression of the concept that the first unit of production has special meaning. Devising a first article schedule means creating the schedule of events, or tasks, necessary to complete the first aircraft – the first article.

A particular type of first article plan useful when the manufacturing or production process is inherently unknowable until it is attempted is referred to as a development program using a prototype. This program is frequently a precursor contract to a follow-on contract that embodies all the relevant information to produce, schedule, and cost the new or remanufactured aircraft, according to Allen C. Haggerty, plaintiff's expert in aircraft manufacturing, an aeronautical engineer and former aerospace executive at Boeing and McDonnell Douglas.

Although witnesses did not recall specific discussion about the use of a prototype, the March 1992 presentation held at WVAC includes a preliminary schedule, based on the SD3-30 and an award date of May 1993, with a notation of "11 Months Prototype Development." Plaintiff certainly was familiar with the use of a prototype; it used a prototype on the Tucano program.

Both WVAC and plaintiff scheduled a first article plan. Built into a contract schedule with a first article typically is a lead aircraft that is completed, tested, and approved before production commences on the second. However, although the first article plan anticipated more time to complete the modification work on the first aircraft, by the time work would be completed on aircraft 1, it contemplated that work would have already begun on aircraft 2, according to Mr. Nesbitt, whom plaintiff substituted as General Manager at WVAC. This was not a true first article plan, in his opinion. Mr. Maguire testified that the delivery

schedule precluded the use of "the opportunity to have a separate first article activity[.]" Tr. at 646.

WVAC was obliged to propose to plaintiff a schedule that would meet ATCOM's delivery requirements. WVAC early on worked on putting together a schedule for its production. The March 7, 1991 presentation hosted by WVAC, with Belfast participating, included a proposed schedule. Through 1991 and 1992, the schedule was revised until it was finally incorporated into WVAC's actual draft proposals.

Mr. Bowyer worked extensively on creating the proposed schedules. He did so in conjunction with plaintiff, just as he collaborated on the technical requirements of the proposal. To do so, he applied the learning curve theory. Because he was not knowledgeable on this subject, Mr. Bowyer prepared himself for the task by researching the issue. 31/ He recalled finding approximately two articles on the subject. He also sought out people at Belfast to assist him. Learning curve was discussed by all members of WVAC's management team. He recommended, and WVAC ultimately chose, an 80% learning curve with a set-point at aircraft 10, T-10. Mr. Bowyer took the recommendation of Mr. Devitt, Vice President and General Manager of WVAC – Mr. Devitt having overall responsibility for WVAC's proposal. The latter's view was that "you don't learn anything after the first half of the project because, when you're winding things up, other things happen." Tr. at 2226.

WVAC plugged in its standard-hour estimates, including the kind of manpower expected, at T-10 to create the learning curve, which established estimates for how much time would be required to complete each aircraft. A set point of 10 with a learning curve of 80% is not the industry standard, which usually utilizes 100 as the set point, according to Mr. Haggerty. Utilizing a T-10 had the effect of building most of the costs into the first 10 units. As the project was not envisioned as a full production run, WVAC did not utilize a set point that allowed for learning over a longer period of time. From these estimates WVAC created a schedule of work on each aircraft, which was incorporated into its proposal submitted to plaintiff, and which, in turn, was proposed to ATCOM in plaintiff's final proposal. WVAC received input from plaintiff's February 1993 evaluation of WVAC's use of labor hour estimates, material costs, and various other parts of the proposal, which WVAC incorporated. WVAC was now prepared for the government should-cost audits.

31/ Prior to Mr. Bowyer's work, WVAC already had been applying learning curve for its scheduling.

The amount of labor also impacts scheduling. The concept of the "build rate" reflects that a faster build rate has more manpower. The build rate was another variable in WVAC's proposal, along with its assessment of the number of laborers needed at any given point, which included judging how many laborers could work on the aircraft at one point and what work could be performed simultaneously.

Of course, the higher the build-rate, the more manpower, the faster the scheduling, but that all had to be balanced with WVAC's labor capabilities. Scheduling became a matter of negotiation between plaintiff and WVAC. Plaintiff did push WVAC to propose a faster delivery schedule.

WVAC's responses to plaintiff's inquires are illustrated by a fax from Mr. Compton to Mr. McCoy dated January 19, 1993. Mr. Compton wrote:

> Acceptance of Shorts proposed 1.54 aircraft per month delivery rate is not feasible for the following reasons:
>
> 1. A period exists in Short[s'] schedule where more aircraft are in work at a given time than we have space for. A maximum of seven (7) aircraft can be worked simultaneously in the allocated space. . . .
>
> . . . .
>
> 3. A consistent dispersement of manpower throughout the C23 program is essential in order to keep WVAC's costs in line. If WVAC adapts [*sic*] Shorts proposed delivery schedule, there will be excessive fluctuations in the number of personnel required to accomplish the program.

With respect to WVAC's application of the learning curve, plaintiff noted in a May 27, 1993 letter to ATCOM that "WVAC application of labour learning, whilst a different philosophy to that used by Shorts, is considered reasonable and reflects the differences between a manufacturer and a modification centre." The "different philosophy" manifested in WVAC's estimates to establish the number of standard hours required to complete aircraft 10 (the set-point), as plaintiff was aware that its system for estimating manpower was different than that used by WVAC.

7. ATCOM's approach to the proposal

ATCOM played an important role beyond developing the SOW and before conducting audits of the proposals during 1993 prior to award.

1) Pre-proposal activity

In conjunction with SOW work beginning, at least officially, in 1992, steps were taken during that time to obtain authorization for the program. ATCOM approved the Acquisition Plan on April 21, 1992. The Acquisition Plan describes the project, as follows: "The [20 C-23] aircraft will be re-manufactured using SD3-30 aircraft from contractor and U.S. Army inventory." It also illustrates ATCOM's assessment of risk at the time, prior to the change to the SD3-60 and prior to the plaintiff-induced discussion regarding the use of the term "remanufacturing" in the developing SOW.

ATCOM's initial assessment of the risk overall was "moderate." Technical risk was considered "moderate" because "the aircraft is a re-manufacturing of a production aircraft with no new, unusually stringent, or critical technology requirements." The technical risk assessment also included the following: "Changes in the scope of effort may occur during production necessitated by trade-off analysis based on cost of changing the configuration of an existing aircraft versus user requirements." Schedule risk was high because of plaintiff's "previous production history and the fact that the contractor has never engaged in a remanufacturing effort of this scale." ATCOM concluded that "[h]igh risk on production schedule is currently acceptable due to current development of planning and force structure required to support the operation of the C-23C fleet. As delivery timeframe nears, the risk should be reduced to moderate then low." At the beginning of SOW deliberations in January 1992, Contracting Officer Mead outlined to plaintiff the contract structure, establishing that it would proceed as a firm fixed-price contract. The Acquisition Plan posed a startling delivery schedule of one aircraft per month over two fiscal years ending in 1995.

The meeting of project personnel from plaintiff and ATCOM on June 29, 1992, discussed above, recorded Mr. Crawley's strong objection concerning the use of "remanufacture" to describe the project. Even though ATCOM removed the term from the SOW at plaintiff's insistence, ATCOM continued to use the term to describe the project internally. For example, ATCOM submitted a "Request for Approval of the Justification for Other Than Full and Open Competition for Twenty C-23C Aircraft Remanufactured from the Shorts SD3-60 Aircraft" on September 10, 1992. Plaintiff did not have access to this document.

The court could cite other documents manifesting ATCOM's interchangeable use of "re-manufacture" and "modification." The evidence, however, does not warrant a finding that ATCOM disassembled as to the true nature of the work required. ATCOM, just like plaintiff, was aware that elements of the project were not addressed adequately in WVAC's proposal as put forward by plaintiff, and in plaintiff's proposal as a whole.

While the 1992 SOW deliberations chiefly involved plaintiff and ATCOM, ATCOM had a relationship with WVAC. Lt. Col. Oliver, Product Manager, Fixed Wing Utility Aircraft, who was ATCOM's Project Manager on the C-23B+, visited WVAC on October 6, 1992. WVAC made a presentation, introducing Lt. Col. Oliver to the WVAC personnel and describing the basic work contemplated for the C-23B+ project at WVAC. Shortly thereafter, WVAC hosted ATCOM at its facility on November 17, 1992, for the purpose of reviewing WVAC's capabilities. WVAC presented itself as a repair and overhaul modification center.

Major Ron Klein of ATCOM wrote a memorandum to Lt. Col. Oliver on the November 17, 1992 trip to WVAC. He also faxed this trip report to WVAC's Mr. Long. He described several findings related to WVAC's state of preparation. Cognizant that "[t]he WVAC is a new operation[,]" Major Klein concluded in this report that WVAC's "situation is appropriate[,]" and he had "few doubts that they will have all the pieces in place by September." He did, however, detail what "pieces" he thought needed work. These included, in part, the following deficiencies: WVAC's sheet metal area, which existed but was not staffed and was nonoperational; WVAC's part-ordering system needed alteration; no Material Review Board procedure, "nor any procedure to address non-conforming material[;]" no quality or government-approved accounting system; and no parts tracking system "to maintain control of parts removed from an aircraft or parts due in to [an] aircraft." Major Klein also observed:

> As a company, they do not have experience modifying an aircraft to this extent. Neither do they have experience with a production type (i.e. established tasks on repetitive aircraft). On Service Life Extension Programs (SLEP) and major modification programs contractors (and CCAD) routinely rely on cannibalization to meet schedule. This invariably means the last aircraft in the program are delivered late. WVAC has no experience in this type of program and hence, may not be aware of this kind of typical error in managing this program.

He also commented that "[t]here is little doubt that WVAC has the floor space or equipment . . . to complete the modification." He anticipated several issues related to aircraft parts as well:

> They do not have a parts tracking system (software or paper) to maintain control of parts removed from an aircraft or parts due in to an aircraft. The modification program will require a significant effort in this area. They will need a tracking system and storage (e.g. cages, carts, bins) to

accommodate the parts removed from an aircraft during the months that it will be disassembled, stripped, reassembled, painted, etc.

One day after that presentation, Mr. Mead wrote a memorandum captioned "Contracting Officer's Determinations, Solicitation DAAJ09-92-R-0819, C-23C Remanufacture." Mr. Mead approved of the CLIN structure as the least costly because it isolated, or broke out into a separate pricing structure, aircraft purchases and O&As in order to assure reimbursement costs for the former and a ceiling on the latter. He also approved of the use of a fixed-price contract: "[T]he Government intends to have FFP CLINS because performance risk by the incumbent contractor is considered moderate and cost can be predicted with a reasonable degree of certainty based on a definitive [SOW]." ATCOM had undertaken some cost estimating of its own at that time and noted in a December 29, 1992 memorandum to management that it established a negotiated price of $6.1 million per aircraft, well in advance of proposal submission.

2) Proposal period activity

ATCOM's involvement with both plaintiff's and WVAC's proposals accelerated during 1993. ATCOM received plaintiff's draft proposal, which incorporated WVAC's draft proposal, during the first few months of 1993. Its plan, as outlined by a May 20, 1993 ATCOM internal memorandum, was to review the proposal and pose questions to plaintiff, in addition to conducting a standard should-cost audit.

The series of questions began on March 19, 1993, when Mr. Mead wrote to Mr. Coey, Belfast Contract Manager, with "the first in a series of questions/comments on the subject proposal." It included over thirty questions and comments to various sections of plaintiff's proposal. ATCOM issued a total of six sets of queries. The second set of queries, dated April 5, 1993, included several questions about plaintiff's – meaning WVAC's – application of learning: "Describe how your labor learning of 85 percent is comparable to K-1 through K-16[;]" "[d]emonstrate where your average learning factors come from. Why do your learning rates change if production between 1-27 is uninterrupted? . . . What objective basis did you see for 4.5 percent escalation?" These questions stemmed from ATCOM's disagreement with how plaintiff applied its learning. ATCOM concurred with the use of the learning curve in general, but judged that plaintiff attributed excessive learning.

These questions continued up until contract negotiations. A set of queries issued on June 2, 1993, states ATCOM's objection to the number of engineers that Belfast was going to provide on-sight at WVAC:

> 1 person at [de Havilland] and 6 persons at WVAC. In fact, this is a reasonable number of persons to be on site thru the 1st article. After the 1st article the number should be reduced to almost no persons authorized on site long term TDY. . . . Only 1 engineer should be authorized after 1st article. Additional engineering support could come from stateside and that's what should be authorized for cost purposes.

ATCOM concurred with having one person at WVAC as production engineer, one as tooling engineer, two as production supervisors, and one for quality assurance. ATCOM also objected to the proposed number of trips from Belfast to West Virginia: "Recommend only official business return flights be allowed a maximum of one per year per person." Mr. Mead duly forwarded plaintiff's responses to technical personnel at ATCOM.

ATCOM conducted a should-cost audit of the proposal through joint efforts of ATCOM, Defense Contract Management Area Office ("DCMAO") Pittsburgh and Defense Contract Audit Agency ("DCAA")-Mid Ohio Branch. As ATCOM documented in a May 28, 1993 internal memorandum, the purpose of the cost review was "to identify uneconomic or inefficient practices so that a fair and reasonable estimate can be established on what the contract should-cost the Government in a more efficient environment as a basis for negotiation." The purpose of the technical review was "to ensure that the scope of effort and range of technical analysis expected are clearly understood." The memorandum states that "[t]he technical elements for review covered the areas of production scheduling, inventory, aircraft storage/maintenance, engineering, assembly, inspections, and flight testing."

DCMAO Pittsburgh personnel conducted a technical analysis of WVAC's proposal by using "contractor supplied information" and a tour of the WVAC facility on April 29 - 30, 1993. DCMAO issued a May 14, 1993 memorandum documenting the technical analysis. This memorandum described the project, in part, as follows:

> The [SOW] . . . established the contractor requirements for procurement, refurbishment and modification of Shorts SD3-60 commercial aircraft, into C-23B+ aircraft . . . . This SOW includes the design, development, and manufacture of modifications and installations of those modifications to convert the SD3-60 aircraft into C-23B+ aircraft. WVAC's proposal is comprised of two volumes, Volume I - Technical Proposal and Volume II - Cost Proposal. Volume I of the proposal describes the work that WVAC understands will be necessary to convert an SD3-60 aircraft to a C-23. Volume II, the Cost Proposal, is also based on this understanding. Short Brothers, as Prime Contractor to ATCOM, has primary responsibility for the design effort. . . . WVAC is primarily involved in the inspection,

refurbishment, modification, assembly, painting and flight test support of the supplied GFE Aircraft.

DCMAO concluded that "[t]he contractor's proposed direct materials were found to be applicable and allocable to the refurbishment/modification . . . . Based on a review of the SOW, WBS, and WVAC's estimating techniques, no exceptions are recommended to the non-recurring time." DCMAO did take exception to WVAC's learning curve methodology and ultimately recommended a reduction of total hours by 11%. While DCMAO found WVAC's baseline 8,028 hours reasonable, it criticized WVAC's 80% curve at T-10, citing WVAC's use of the only model available to it "since most of their efforts are expended on small or one time jobs." DCMAO disagreed with WVAC's "proposed cessation of learning at Unit #10[,]" and, instead, proposed an 85% learning curve from units 1 - 20, with 8,028 hours at unit 10, and a 90% learning curve for units 21 - 30. This analysis was predicated on "refurbishment" and "modification" of the aircraft.

Mr. Maguire recalled that "the [G]overnment was very complimentary on the standard of the WVAC proposal and on how detailed and comprehensive it was[.]" Tr. at 724-25. Mr. Mead gave plaintiff a "heads up" on various issues that would need to be addressed before the parties could go to price negotiations. Mr. Mead's undated notes, JX 183, see also Tr. at 726, show that he was "generally satisfied [with the] hours estimate" for design engineering and "[s]tructural drawing office has good definition," although he had some concerns, e.g., that plaintiff's proposal had a "lack of top level participation except financial."

ATCOM thereafter traveled to Belfast with a should-cost team from May 4 - 7, 1993. Preliminarily, Mr. Mead wrote Mr. Maguire on April 13, 1998, explaining that "[d]uring this visit we expect to gain a comprehensive understanding of the Shorts PLC proposal and [de Havilland] subcontract." That letter also identified approximately ten government personnel who would attend, including five personnel on the technical review. That visit concluded with an exit briefing by Mr. Mead to Mr. Maguire and others that stated "a duplicity of functions" appeared in the proposal. Tr. at 722. ATCOM wanted plaintiff to reduce the support that it was proposing to provide to WVAC for almost every discipline.

The DCMAO tour of the WVAC facility and the ATCOM visit to Belfast were followed by another visit to WVAC by Mr. Mead and other Army officials on May 18-19, 1993. Although the technical analysis had been performed earlier, this May 18-19 visit represented the official should-cost meeting, and it included the cost review performed by ATCOM and DCAA representatives. Mr. Mead presented to WVAC the findings of DCMAO's analysis, documenting his conclusions in a May 20, 1993 memorandum to Lt. Col. Oliver, wherein he stated that "Government consensus of the Should Cost review

indicated that WVAC['s] proposal and state of preparation was straight forward and very acceptable."

Major Klein, who attended the should-cost audit of WVAC, wrote separately in a May 20, 1993 memorandum documenting the May 18 to 19 trip report to WVAC. Similar to Mr. Mead, Major Klein concluded that "[o]verall, WVAC has made significant progress since the visit of 17 Nov 1992. My assessment is that they are on schedule or ahead of where they need to be to implement this conversion program." He does mention ATCOM's concerns, including part tracking systems and manpower. David Hackney, another government representative in attendance, wrote on May 12, 1993, that "[plaintiff's] learning philosophy and WVAC's learning philosophy don't seem to totally match up." 32/

An ongoing exchange of questions and answers between ATCOM and plaintiff regarding various issues in plaintiff's proposal continued through June 1993. In particular, ATCOM's recurrent concern about the duplication of functions and level of support to WVAC, and overall dissatisfaction with plaintiff's earlier answers, prompted Mr. Maguire to correspond with Mr. Mead by letter dated June 18, 1993. Mr. Maguire described the various responsibilities of individuals, including detailed descriptions about "production supervisors" and the "production engineer and tooling engineer." Overall, plaintiff intended such personnel to provide WVAC with the benefit of engineers with prior experience on the C-23B, to liaise with Belfast's design team, to support and ensure efficiency with respect to production processes, and to "minimise to the fullest extent possible production and schedule impacts arising from uncommon damage conditions and immediately corrective action if concessions are required. Check for acceptability or its [e]ffect of deviation on next assembly."

Following the should-cost audit, ATCOM geared up for contract negotiations by conducting several preaward surveys. On June 21, 1993, DCMAO visited WVAC to conduct

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32/ On June 11, 1993, DCMAO issued an audit report which, by its terms, was a "supplemental report" to an original audit report dated May 13, 1993. Although the record does not include a DCMAO audit report with that date, the supplemental report indicates that the government technical evaluation was not available when DCMAO issued the May 13th report; hence, the supplement.

According to the June 11, 1993 supplement, DCMAO concluded that "the cost and pricing data submitted by the offeror are inadequate in some respects[,]" but WVAC's proposal was considered to be acceptable for negotiating a "fair and reasonable price."

a preaward survey for quality assurance. The survey, signed that day, recommended award and stated, in part, the following:

> [WVAC] is a mid-size company that specializes in the maintenance and overhaul of small commercial aircraft for several major airlines . . . . During our preaward survey visit an American Airlines Shorts 360 was in the process of having general maintenance and painting done on it. The company has an experienced and well trained workforce with all of the necessary inspection and test equipment. . . . The company anticipates hiring additional personnel to attain peak production. [WVAC] has a quality control manual . . . [that needs] further additions and revisions . . . to bring [WVAC] into full compliance. . . . [WVAC] is aware of the deficiencies and has formally committed to resolve the subject areas prior to the first article and production. . . .
>
> NOTE: In as much as WVAC would be acting as a subcontractor, this survey is based on the tasks outlined in WVAC technical proposal to Short PLC[.]

The preaward survey of WVAC's financial capability, signed June 29, 1993, also recommends complete award. It does note that "[WVAC] is at risk financially[,]" but recommends award contingent on WVAC receiving an extension of its line of credit. 33/

On June 23, 1993, ATCOM recommended complete award with WVAC based on the technical preaward survey. This preaward survey concluded, as follows:

> The offeror understand the requirements, specifications, and drawings. The offeror has sufficient technical management personnel on board to perform on the proposed contract. The offeror has the technical knowledge in specialized areas. After reviewing the resumes, of they key personnel, and visually observing operations in the production and planning areas, the key personnel at [WVAC] display the technical capability to perform on and meet the requirements of the proposed contract solicitation.
>
> The offeror has demonstrated complete knowledge of the solicitation requirements and has a realistic plan to perform all the required work.

33/ Plaintiff also had a similar concern, which represented the last administrative item resolved prior to award.

The June 23, 1993 preaward production survey recommends approval, as well, after an on-site visit by DCMAO conducted on June 21, 1993. DCMAO's preaward survey describes the solicitation requirement as one "for procurement, refurbishment and modification[.]" Further, DCMAO explained that "[t]he general types of production processes involved are, inspection, paint, interior refurbishment, maintenance, avionics and sheet metal replacement and repair." DCMAO was highly complimentary of WVAC and the technical proposal, providing positive assessments on all aspects of the WVAC technical proposal, including management structure and personnel. DCMAO declared that "[n]o additional plant facilities, production equipment, or rearrangement will be required by the offeror to perform on the proposed solicitation. The space available for offices, engineering, manufacturing, inspection, storage and shipping [is] considered adequate."

Regarding the delivery schedule, the June 23, 1993 preaward production survey stated:

> The offeror's milestone chart . . . is satisfactory to permit delivery of the aircraft within the required time. The proposed contract delivery requirements will not have any significant impact on the contractor's current or future delivery schedules. . . . However, there are two major elements that could have significant impact on the proposed delivery schedule. The over and above proposals, and disposal and or removal of the old tail section. Following the tear down inspection, over and above proposals are to be negotiated on a case by case basis between the contractor and the Administrative Contracting Officer . . . . Therefore, if there is a delay in the deciding on whether to perform or not to perform on the over and above proposals . . . ; the proposed delivery schedules will not be met.

DCMAO also noted that "[t]he offeror, has not produced the identical item (under Government Contract) but the offeror has produced similar items requiring the same manufacturing processes and procedures for commercial customers."

Despite these preaward surveys recommending approval of the plaintiff and WVAC proposals, ATCOM had significant concerns. Regarding methods engineering, or production engineering, ATCOM's engineering specialists stated in a memorandum dated June 23, 1993, as follows:

> The PED [Production Engineering Design] hours for Project Liason (2500 hrs) and Shop Support for 17 Aircraft (7400 hrs) are unjustified by [plaintiff]. The back-up data supplied by [plaintiff] is based on guestimates of manufacturing work hours being accomplished by [de Havilland] and WVAC and then

> multiplied by a guesstimate (%) of Shorts in-house time. The guestimate working hours do not follow an 85% learning curve as do all other manufacturing hours in the proposal. The Shorts percentage of PED work is also based on the manufacturing hours being done at Short Brothers. The total PED hours proposed for this contract is nearly one-half of the hours proposed for each of the full production C-23B contracts (18,330 vs. 42,953). In our estimation, the PED hours for "Shop Support for 17 Aircraft" should be reduced by an additional 2000 hours. This would represent a more reasonable percentage of time for PED hours on the first four aircraft.

ATCOM completed the preaward survey of WVAC, and Mr. Mead mailed a one-page letter on July 19, 1993 to plaintiff with only two comments. One comment alerted plaintiff that WVAC's quality control manual needed revision in order to be brought to full compliance with the military specifications. The other comment noted the need for WVAC to obtain approval on its request for an extension of credit.

With all of this information, Mr. Mead produced ATCOM's Business Clearance Memorandum (the "BCM") on August 3, 1993. He described the background, as follows: "In 1992, Shorts ceased production of the C-23B aircraft and the Shorts' commercial airliner from which it derives. To meet the statutory requirements above, the proposed quantity of aircraft will be remanufactured from used commercial aircraft." The BCM explains that, in terms of contract price, the contract assures that "the Government doesn't pay more for a remanufactured C-23B+ aircraft than what a new one would be worth[.]"

The risk assessment reflects Mr. Mead's opinion: "The Contracting Officer judges that the total technical, cost and schedule risk for the C-23B+ aircraft remanufacturing program is moderate to high." He discussed three types of risk:

> (1) The technical risk is high because: (a) Shorts has never established an aircraft remanufacturing program of any kind (Shorts has always manufactured new aircraft); (b) WVAC, is financially unstable, has only been in business since Jul 91, has never done business with the Government, does not possess the range and depth of experienced personnel necessary to perform the program and thus is a high risk aspect of contract performance; and (c) a very high level of manufacturing tolerance must be maintained to separate the aircraft into four sections and reassemble it from three sections.
>
> (2) The cost risk is low. Most of the cost is FFP [firm fixed-price]. The cost of commercial aircraft, although reimbursable, is predictable based on prevailing market conditions. Although the contract contains over-and-above

provisions, the contractor assumes the total cost risk at a negotiated aircraft ceiling price level.

(3) Schedule risk is judged to be high. Shorts has a poor history of on-time delivery. Because neither the prime nor its subcontractor has experience scheduling a remanufacturing program of this scope, the proposed schedule is unreliable.

The BCM evaluates the amount of risk to plaintiff as "slightly more risk to the contractor than that encountered during a normal production run for new aircraft."

Mr. Mead's conclusions, as expressed in the BCM and only made known to plaintiff through a subsequent Freedom of Information Act request, stand in stark contrast with how he and other ATCOM personnel described the project to plaintiff throughout this period. The testimony is consistent and the documentary evidence uniformly demonstrates that ATCOM never stated or implied to plaintiff a level of risk that was "moderate to high." Indeed, Mr. Brundle, the top official of plaintiff, testified to plaintiff's team's "grave disquiet" with the unshared information; the team "read some of the information with a sense of outrage." Tr. at 3955. Instead, ATCOM throughout had reassured plaintiff that the task was a straightforward modification/refurbishment job. The feedback from the audits and numerous visits to WVAC was positive, and any unresolved concerns that ATCOM may have harbored did not impede contract award. Mr. Brundle was only one of many witnesses who held the belief that the project was "relatively simple straight-forward modification work." Tr. at 3957. Had plaintiff been aware that ATCOM contemplated a remanufacture, these witnesses were emphatic that plaintiff would not have proceeded. As Mr. Brundle explained, "Remanufacturing is not a U.K. terminology or indeed terminology that Shorts would have been familiar with." Tr. at 3956-57.

Particularly galling to plaintiff was Mr. Mead's assessment of the cost per aircraft memorialized in his BCM. Chiding plaintiff for "grossly over-estimat[ing]" the necessary level and duration of on-site support from Belfast, he stated that the Government's recommended position was $5,570,000.00 per aircraft based on thirty aircraft (compared to $6,562,460.00, the cost to manufacture a new C-23B and $6,170,249.00, plaintiff's proposed cost).

8. Contract negotiations

The parties conducted contract negotiations from August 10 to September 9, 1993. Through the price negotiations, Mr. Mead indicated to plaintiff that its proposal had very low risk. His negotiation strategy notes, dated August 7, 1993, stated "so much fat in proposal

that 15% profit is ridiculous/[plaintiff] has no cost risk[.]" Although he also noted in this document that "WVAC is high risk to program[,]" he did not communicate that evaluation to plaintiff during contract negotiations.

In fact, ATCOM strived to reduce the labor hours in plaintiff's proposal. As Mr. Mead noted in an August 21, 1993 internal memorandum, "[plaintiff] has too many labor hours/10.5% more than [it] normally gets[.]" Plaintiff was hesitant during negotiations because, as the August 21, 1993 memorandum reflects, "[plaintiff] won't accept program risk[.]" Plaintiff's witnesses were adamant on that point, and the record bears them out.

Plaintiff's May 24, 1993 revised proposal included an amount of $184 million for thirty aircraft, total, including the ten option aircraft (the option for eight was exercised). Negotiations produced agreement on September 1, 1993. On September 30, 1993, the Government awarded plaintiff contract No. DAAJ09-93-C-0656 in the amount of $143.6 million for up to thirty aircraft. 34/

9. The contract

The contract awarded on September 30, 1993, was a procurement contract for twenty C-23B+ aircraft, with an option for an additional ten aircraft. It had combined fixed-price, cost-reimbursement, and time-and-material features. Firm fixed prices predominated (69.2% of the total contract price).

The contract required plaintiff to purchase the candidate aircraft after a pre-purchase inspection; complete the modification work, testing, and certification; and deliver the aircraft to the Government. The structure of the contract includes seven separate Contract Line Item Numbers ("CLINs"). CLINs 1 through 3 are the most important. CLIN 1 covers the acquisition of the aircraft; CLIN 2, the modification activity; and CLIN 3 is the O&As.

CLIN 1 allocates a ceiling price of $1.1 million per aircraft purchase on a cost-reimbursable basis. The modification activity, CLIN 2, was a firm fixed-price amount. CLIN 3, for O&As, provides a funding limit on any approved O&A required per aircraft. However, any amount less than the $1.1 million applied to an aircraft purchase would be added to the O&A account.

To purchase the aircraft, under CLIN 1, which was defined by section 3.1 of the SOW, plaintiff was to create a list of candidate SD3-60s, conduct a pre-purchase inspection, and

34/ The contract lists a total price of $113,569,796.00 for twenty aircraft.

submit a pre-purchase report to the Government for approval. Once approved, plaintiff was required to transport the aircraft to WVAC, at which point title would transfer to the Government.

CLIN 2 is described in section 3.2 of the SOW: "C-23B+ Aircraft Modification/Configuration and Qualification/Certification." It requires plaintiff to perform a tear down inspection of each aircraft after acceptance into the program, which was intended for determination of "the level of effort required to refurbish the aircraft" and "form the basis for determining the level of repair effort . . . required for each C-23B+ aircraft." SOW § 3.2.1(a). Relatively minor repairs identified and covered by section 3.2.5.13.1 35/ were to be included in a firm fixed-price proposal per aircraft for approval. Needed repairs identified during the tear down inspection, but not covered by section 3.2.5.13.1, were to be included separately as part of the O&A category covered by CLIN 3. SOW § 3.3(a). CLIN 3 requires plaintiff to submit a separate O&A proposal for approval. Id.

Plaintiff was to complete the modification, repair, and testing required to do the actual conversion from the SD3-60 aircraft to the C-23B+ as defined in the SOW. The rear fuselage was to be completely removed behind the passenger cabin and replaced with a new aft fuselage. De Havilland was the subcontractor responsible for manufacturing the new rear fuselage. The forward fuselage had to be shortened, which involved cutting the aircraft in half at a point, somewhere between the flight deck and wing, to be determined by plaintiff. Thirty-six inches of the fuselage then had to be removed, and the aircraft was to be rejoined. With regard to the two most major modifications – replacing the rear fuselage with a new one and shortening the fuselage, the contract required plaintiff to "modify all original aircraft systems . . . affected by removal of the 36 inch forward fuselage section" and to "remove all original aircraft systems components . . . required to permit the removal of the original rear fuselage and installation of the new rear fuselage[.]" SOW § 3.2.5.11.2(g)(1) & (2).

The aircraft needed a modified or new fuel tank to match the fuel capacity of the C-23B. The avionics systems must meet new specifications, so too did the main instrument panel, which had to be entirely replaced. A new set rail and modified cabin furnishings similar to the C-23B were to be provided, as well as a role beam that would be used for the cargo drop and paratrooper drop. The engines also had to be modified – both the SD3-60 and the C-23B have two propeller turbine engines.

35/ These included corrections such as missing rivets, "surface corrosion that has not progressed to the point of requiring replacement of the part[,]" minor surface damage like dents and scratches, and general cleaning. SOW § 3.2.5.13.1.

After modification and repair, plaintiff had to conduct a "Fatigue Analysis," which "shall show (based upon past aircraft usage history) that the life of the aircraft and critical components shall exceed a minimum of 12,000 flight hours." SOW § 3.2.5.3(c). The fatigue analysis was accomplished in reference to the mission profile of the C-23B+, which SOW section 3.2.5.3(c) described as: cargo - 79%, passenger - 15%, paradrop/cargo drop - 5%, and ferry role - 1%.

The schedule of activities was set out in plaintiff's technical proposal and approved by ATCOM during the audits.

III. CONTRACT PERFORMANCE

After contract award on September 30, 1993, the performance phase of this contract commenced. Including the option that was exercised for an additional eight aircraft, plaintiff should have completed delivery of all twenty-eight C-23B+ aircraft, pursuant to contract, by November 1997, according to the BCM. Completion, however, did not occur until September 1998. The parties intended that the SOW, including the WBS and the delivery schedules, describe exactly what was to occur during that time period. What actually transpired was far different.

1. Activities prior to the arrival of aircraft 1

Issuance of the Notice To Proceed triggered the start on October 1, 1993, of plaintiff's "first article plan," which was a schedule incorporated in plaintiff's technical proposal. Although the "first article" refers to aircraft 1, the actual modifications could not be performed until plaintiff produced the engineering drawings; thus, the first-article schedule encompassed the one-time, "non-recurrent" design engineering activities.

In addition to the production of design engineering drawings, other non-recurrent activities were capable of being performed before initiation of actual aircraft modification work. Many of these activities, although not requiring an aircraft in the hangar, were dependent on the content of the design engineering drawings. Tooling, for example – the design and manufacture or procurement of the tools necessary to work on the aircraft – primarily could be accomplished only after the design engineers determined what the modification would entail. Activities such as the creation of the BOM, and to some extent parts procurement, were other non-recurrent activities. Plaintiff utilized, initially, its existing parts supply personnel in PALS, the department that had been supporting aircraft all over the world for some time.

The first article schedule also identifies methods engineering as a non-recurring activity. Although the creation of the WPS's – instructions to laborers on the shop floor – was intended to be predominantly a non-recurring activity, plaintiff never expected that the WPS's, once created, would be cast into stone. By a process called "redlining," to be discussed, WPSs could be changed at any time during the life of the contract. According to Mr. Ballard, by the time the first article was created, it was contemplated that any changes to the WPSs would be mere "fine-tuning." Tr. at 2523.

Insofar as these activities were tailored to the actual modification activity, plaintiff's output was WVAC-bound. But plaintiff, during this time period, also would discharge support responsibilities with respect to its other subcontractors, principally, de Havilland, which was supplying the rear fuselage, tailplane, and fins.

1) Detail design engineering drawings

After award plaintiff immediately formed a design team to create the detail design drawings. Although the detail design drawing process was scheduled to take approximately ten months, Mr. Stripe recalled that the work took approximately forty weeks. Stripe Dep. ¶ 130. While the design activities did not formally commence until after contract award, design engineers were involved during the proposal phase of the project, which, as described above as the "concept" stage, was the first of the following four-stage process: (1) concept design; (2) design definition; (3) design scheme; and (4) production or detailed design.

Patrick N. Cowan, a design engineer, who assisted Mr. Stripe on some of the initial design and became Engineering Manager at WVAC, characterized the design definition phase, which commenced immediately upon award, as the "sizing" of the task, in terms of, for example, material thicknesses and quantities, types of materials, and number of attachments to structural joints. Tr. at 2941-42. According to Mr. Cowan, the definition phase is "a high-level assessment of what the engineering requirements are . . . [and] would also define a route to certification probably." Tr. at 2942. Stress engineers would produce some initial load assessments during the definition phase, and the stress reports would be developed throughout the rest of the phase. The involvement of stress engineers, and particularly the analysis that they undertook during this phase, significantly distinguishes the definition work from the preliminary concept phase – to wit, no stress analysis occurred until the second stage.

With the definition stage complete, engineers would work on the schemes. The scheming stage started with design engineers' layouts of what they envisioned as the design for the particular part or assembly. The schemes then would be sent to stress engineers for their input, which included load analysis and, for example, checking to see if the material

was sufficiently thick. The schemes would go back and forth between plaintiff's design engineering department and stress engineering department, forming what Mr. Cowan called an "iterative loop." Tr. at 2942.

After receiving approval from stress engineers, the schemes would be moved into production detail design work, where a team of engineers would take the schemes and create the final detail engineering drawings. During this final phase, in addition to the detail design drawings, engineers would complete stress reports, certification documents, test reports, instructions on how to test the equipment, and other final output documents.

These phases of the design engineering work occurred immediately after award in October 1993 through approximately July 1994. Once completed, plaintiff sent the detailed design drawings to WVAC, thus allowing WVAC to tackle the massive planning tasks that could not be completed until receipt of detail design drawings. WVAC's planning, however, was ongoing during early 1994 and thereafter, because plaintiff released detail design drawings incrementally, rather than withholding them until total package completion.

Although the modification activity, and the planning for it, took place at WVAC, Belfast's planners used the detail design drawings, because plaintiff's contractual responsibilities included parts procurement. Accordingly, once methods engineers in Belfast received the detail design drawings, which identified needed parts for procurement, the procurement team would set about ordering parts, prioritizing those with long lead-times, *i.e.*, those parts requiring longer periods of time to procure. The Tool Design Group also would receive the design engineering drawings, develop designs for any new tools needed, and direct the manufacture or purchasing of those tools.

2) Pre-purchase inspection

While this engineering was ongoing, and while plaintiff began to procure parts for its subcontractors, plaintiff also compiled the list of candidate SD3-60 aircraft, created the pre-purchase inspection checklist, and began to conduct inspections of candidate aircraft pursuant to contract. The pre-purchase inspection was developed by Shorts Inc., based on its end-of-lease inspections of SD3-series aircraft, with which Shorts Inc. had experience.

Mr. Nesbitt, who was destined to become General Manager of WVAC in October 1994, described how the pre-purchase inspection was performed. It involved personnel from both plaintiff, including Shorts Inc. and ATCOM. Generally, ATCOM had one or two representatives at the site where the pre-purchase inspection occurred. The contract stipulated that ATCOM would sign off on each pre-purchase inspection; its approval

signified that the inspection was performed in accordance with the pre-purchase inspection specification and that ATCOM concurred with the findings of the inspection.

Pursuant to contract, plaintiff set about finding SD3-60 aircraft on the market and obtained permission from the owners to inspect the aircraft. These inspections were limited in duration and were not thorough, because the owners, competitors of plaintiff, were in charge. With the aircraft in service, most of the pre-purchase inspections took place at night, when the airliner could ground the plane. Mr. Nesbitt recounted that plaintiff usually would have only one or two days with the aircraft.

The inspection involved both a physical – meaning visual – inspection of the aircraft and a review or audit of the available aircraft records on, for example, engine maintenance, etc. As Messrs. Nesbitt and McCoy explained, those maintenance and service records informed plaintiff as to whether the engines or other parts required overhaul, whether they would be coming up for replacement, when the last maintenance check was performed, and what was known about the history of the aircraft, *e.g.*, where the aircraft previously had been flown, to track its past. This information was intended to guide plaintiff with respect to the extent of repair or maintenance work needed on each aircraft. From it, plaintiff produced estimates on the amount of O&A and labor costs.

The visual inspection also was intended to assist plaintiff in ascertaining the repair required of each donor aircraft, but because plaintiff was conducting inspections on aircraft then in service, the visual inspection was limited and could only give plaintiff "a rough idea of the state of the aircraft[,]" according to Mr. Nesbitt. Tr. at 1094. Although plaintiff examined as much of each aircraft as conditions permitted, the operators prohibited plaintiff's inspectors from removing major systems to determine the existence of any latent problems, such as corrosion underneath or inside certain structures. For example, plaintiff might remove a floor or ceiling panel, but could not remove the skin of the aircraft to observe any damage only visible underneath.

The pre-purchase inspections began in December 1993, and the last inducted aircraft was inspected in April 1997. They were conducted throughout the United States, the United Kingdom, Canada, Sweden, and Guernsey (in the Channel Islands). CLIN 1 allotted a ceiling price of $1.3 million per aircraft, an amount that increased to $1.325 and later $1.35 million. Of the total twenty-eight aircraft, all but three were purchased below the ceiling price, with excess funds – ultimately transferred to CLIN 3 – affording plaintiff some additional funding in amounts that ranged from $19,000.00 to $419,543.00 to mitigate the contract ceiling. Plaintiff inspected thirty-six aircraft, eight of which were not inducted into the program. Mr. McCoy recalled that ATCOM only exercised its right to decline an aircraft once.

3) Preparations for arrival of aircraft 1

With the detail design drawings and pre-purchase inspections underway, plaintiff focused more attention on WVAC in late 1993. Mr. Ballard, the experienced methods engineer who had visited WVAC previously in July 1993 in connection with proposal preparation, was on site at WVAC from November 14 to December 10, 1993, to assist WVAC's planning and preparation for the arrival of aircraft 1. He described his role, more specifically, as helping WVAC implement a five-stage build sequence that he proposed, liaising with Belfast, and providing any information that WVAC needed. Mr. Ballard's assistance was chiefly directed to methods planning.

Mr. Ballard virtually apprenticed WVAC's two sub-contracted methods engineers, Phil Pulliam, who joined WVAC in July 1993, and Lee Martin, a new hire. Although Mr. Ballard's mission involved methods planning, because detail design drawings had not been delivered, only limited planning could take place; WVAC certainly could not create any WPS's. Mr. Ballard familiarized WVAC's planners with plaintiff's drawing system and walked them through plaintiff's drawings for the C-23B+ derivative aircraft, including the C-23B, the SD3-30, the SD3-60, and the UTT. As Mr. Ballard testified, "I had to explain the history of the aircraft and how the drawing system evolved through that, so that they would have an understanding of how the drawing system worked." Tr. at 2475. The methods engineers at WVAC had IPCs for the C23-B and SD3-60 aircraft (the IPC for the C-23B+ would not be available until after the completion of the detail design drawings), as well as the maintenance manuals for these aircraft.

In addition, Mr. Ballard and others at WVAC had access to several SD3-60 commuter aircraft then undergoing maintenance at WVAC, as well as a C-23B aircraft located in an adjacent hangar. Mr. Ballard and the WVAC planners were able to inspect the structure of the SD3-60 aircraft, with some furnishings and floor panels removed, which, as Mr. Ballard testified, enabled WVAC to "get some view into the inside of the aircraft and make some determination of what was behind the furnishing panels and give some explanation to planners of what they were going to have to do." Tr. at 2477. As for the C-23B, the Guard owned that aircraft and allowed plaintiff to view, but not access, it. Nevertheless, Mr. Ballard testified that "it was useful . . . to demonstrate the differences between the SD3-60 and the C-23B." Id.

Although WVAC did not have the detail design drawings, the manuals and the viewing of aircraft enabled Mr. Ballard to guide Messrs. Pulliam and Martin on some high level planning with respect to both technical decisions and a build sequence. The technical decisions included what Mr. Ballard described as the "obvious." Tr. at 2478. Mr. Ballard directed that the wings, the engines, the propellers, and the undercarriage would all have to

be removed. In addition, all the internal furnishings, including the seating, the wall furnishing panels, ceiling panels, and floor panels had to come off. WVAC had to open up all access panels. WVAC was able to begin planning for these initial tear down activities because, individually, these were mostly normal maintenance procedures described in the SD3-60 maintenance manuals. WVAC could not plan for the entire tear down because, according to Mr. Ballard, "it would not be until you had an aircraft in your hands and physically carried out the task that you would . . . really be able to establish what was required." Tr. at 2490. 36/

With respect to the actual modifications, planning was limited because the design engineering in Belfast was still in the scheming phase. However, certain modifications were what Mr. Ballard termed "stand-alone mods," which he believed could be planned directly from the engineering during the conversion to the C-23B+, such as the role-beam installation and the oxygen system. Tr. at 2483. According to Mr. Ballard, it was thought at the time that, once the SD3-60 aircraft was reconfigured to a C-23B (on its way to becoming the B+), the stand-alone mods could be carried across to the C-23B+ with some minor refinement, or "tweaking." Tr. at 2484.

Mr. Ballard and WVAC's methods planners agreed that the planning for these stand-alone mods could be accomplished with existing EPRs (Engineering Process Records – Belfast's term for the WPS) that were used to manufacture the C-23B and the SD3-60. Mr. Ballard described the benefit of using the existing EPRs in his trip report, dated January 25, 1994:

> By identifying and comparing the SD360 and C23B E.P.R.'S and kits that installed the systems in the aircraft during production at Belfast, the parts required to convert the aircraft can be quickly identified. This makes the planning exercise relatively simple, and the existing C-23B E.P.R.'s can be modified to restore the systems and structure using the C23B parts, after the forward and aft joints have been completed. This information is not presently available at WVAC, but would be of major benefit to them when they start to plan this phase of the programme.

With regard to the significant modification that required actually cutting the aircraft in half and removing 36 inches of fuselage, Mr. Ballard was able to propose how WVAC

36/ Even the detail design drawings did not describe the level of tear down required. WVAC would need to know which systems had to be removed, and that was a function of the methods planning based on the detail design drawings, according to Mr. Ballard.

would accomplish the cut, the import of which Mr. Ballard described in his January 25, 1994 trip report:

> We were however able to represent the proposed cut lines on a SD360 aircraft in the hangar. This gave a great deal of clarity to the structural work that had to be done and when I gave some of the senior company engineers a "tour" of the aircraft, explaining in some detail the work that was required, particularly in the roof section . . . , I was conscious of their unease with the estimate they had for labour hours to convert each aircraft. When the design package is complete the availability of aircraft at the Air Centre should help the planning task.

At trial Mr. Ballard reflected that his November 1993 trip represented the first time that plaintiff and WVAC took a serious look, see Tr. at 2723, at work required to perform the cut and the amount of systems that were affected or had to be removed by the cut:

> In 1993, when I was there at that time, we were able to view some of the SD3-60 aircraft and SD3-30 aircraft that were in the hangar at the time. I believe at that time, when we started to look in-depth of what we intended, or what was going to be required to remove from the aircraft, that there was an awareness that there was slightly more to this than what WVAC had anticipated, in terms of removing systems and so forth.

Tr. at 2721-22.

In addition to these more technical decisions, albeit preliminary, Mr. Ballard was able to assist WVAC in creating a build sequence. He compared the WBS with "refurbishing work" that he had performed as a Technical Officer for the Royal Navy and suggested to WVAC's planners that they utilize a five-stage build sequence, similar to his prior experience, which contemplated: (1) opening the aircraft, the tear down; (2) performing the structural changes to the aircraft; (3) adding new structures to the aircraft to support new systems; (4) putting the new systems in the aircraft; and (5) functioning the aircraft. 37/ This five-stage build process was a high level network describing the work flow, but it was not a true critical path schedule.

37/ There was also a sixth stage, not part of the build sequence, which was for the flight test.

Mr. Ballard determined that this type of refurbishment or modification style production sequence would be most suitable for the program. He did recognize, however, that normal refurbishment-type programs involve a "static build," meaning the aircraft would not be moved to another working area from stage to stage. For the C-23B+ conversion, the aircraft had to move because it was required to pass through a jig, which is a large structure that holds the aircraft in place and controls its shape, while the cut is made. Each aircraft would then be moved out of the jig so another aircraft could take its place. While this movement distinguished the process from a more typical, static refurbishment job, Mr. Ballard took care in his testimony to explain that the approach did not reflect a manufacturing assembly line, which he likened to a build moving on a drumbeat. Apart from the movement through the jig, this job, according to Mr. Ballard, was basically still a static build.

Mr. Ballard's January 25, 1994 trip report includes negative comments. These reflected, in part, some concern about WVAC's floor plan. He noted that WVAC intended to allocate one half of the hangar space to the project and that "[g]iven that two large assembly jigs had to be facilitated within this area, and any cranage requirements had to be met with the use of a mobile unit, we had, and expressed grave concerns about the practicalities of such a plan." Mr. Ballard also observed that between his trip to WVAC pre-proposal in July 1993 and the November 1993 trip, "little work had been done on the project" because Mr. Pulliam was the only methods engineer at WVAC, and he had been working on several projects:

> I have no doubts that given the proper resources, the Air Centre will be capable of completing the programme, but I would be of the opinion that with the exception of the two engineers Phil Pulliam and Lee Martin and also the Proramme Manager Bill Pentz, who showed a keen interest in the project, there were few others who appeared to appreciate the size of the task that lay ahead of them.

Concurrent with Mr. Ballard's November 1993 visit, WVAC was taking additional steps to prepare for the arrival of aircraft 1. To meet the goal, WVAC conducted an in-house audit of its operating systems and procedures and hired three additional engineers. Mr. Pentz, the WVAC Program Manager, wrote to Mr. Nesbitt on December 6, 1993, informing him that these engineers were to "perform the process planning for the C-23B+ program." WVAC also began to increase its labor hiring, and it implemented that plan during the later months of 1993. In addition, WVAC was preparing the shop floor for the incoming aircraft. WVAC's goal was to complete the production planning for as many of the tasks as possible by using various documents from Belfast.

Although WVAC preparations were ongoing, problems at both WVAC and in Belfast emerged during the period between Mr. Ballard's November 1993 visit and the arrival of the first aircraft.

WVAC was concerned about the quality of the SD3-60 and C-23B drawings and manuals necessary to assist WVAC in its planning while it waited for the detail design drawings of the C-23B+. The notes of a January 19, 1994 meeting held at WVAC indicate quality problems: The drawings from the SD3-60 and SD3-30, which were intended to assist WVAC with the planning, were "either of poor quality or missing." In addition, the notes indicate that WVAC had not, as of January 1994, received the maintenance manuals for the SD3-60 and C-23B aircraft. (Mr. Ballard explained that the problem was a sufficient number of copies.) Nevertheless, WVAC was pushing forward, hoping to achieve a detailed a first article plan by January 28, 1994.

In addition to some problems stemming from what plaintiff was providing WVAC, WVAC was having its own problems. Mr. Pentz wrote to Mr. Nesbitt on January 14, 1994, updating plaintiff with the status of WVAC's preparation: "Implementation of the direct labor hiring plan is starting slower than planned . . . . The lag in hiring stems from WVAC's inability to effectively process and assimilate the new hires. These short comings are being corrected."

2. Arrival of aircraft 1

WVAC received aircraft 1 into its facility in late January 1994. Although Belfast had not issued the detail design drawings for the modifications, nor was it scheduled to by that time, WVAC could – at least in theory – immediately begin the first stage of the sequence, the tear down, which implemented the CLIN 2 contractual requirement of the tear down inspection 38/ and the removal of any part of the aircraft that WVAC and plaintiff deemed necessary to perform the modifications.

38/ Section 3.2.1 of the SOW described the tear down inspection; subsection (a) described the purpose of the tear down inspection, in part, as follows:

> The contractor shall perform a tear down inspection of each SD3-60 aircraft accepted into the program. The tear down inspection shall determine the level of effort required to refurbish the aircraft. It shall identify aircraft deficiencies requiring correction before release as a certified/qualified C-23B+ aircraft. The results of the tear down inspection shall form the basis for determining the level of repair effort . . . required for each C-23B+ aircraft.

SOW § 3.2.1(a).

As Mr. McCoy testified, and as Mr. Ballard's November 1993 trip report confirmed, the tear down inspection was to be performed in accordance with an ATCOM-approved tear down inspection checklist, which was to be based on the maintenance manual for the SD3-60 aircraft. This was a contractual requirement, as section 3.2.1(a) of the SOW provided, in part:

> The contractor shall prepare, and submit to the Government for approval, a tear down inspection check list according to (DI-MISC-80508). The check list must be based on the SD3-60 Maintenance Program 360/MP Version 5 and made applicable to the C-23B+ modification program. The contractor shall perform each tear down inspection according to the approved check list. One tear down inspection report shall be submitted with the contractor's proposal for each aircraft . . . .

The "SD3-60 Maintenance Program 360/MP Version 5," according to Mr. McCoy, "is very much based on the maintenance program where the areas are inspected with the systems in place." Tr. at 4084. Mr. Nesbitt testified that, like the pre-purchase inspection, "the teardown was based, again, prepared by Shorts Inc., because they had experience in this area, they did it based on what you would see at a . . . heavy maintenance check on the aircraft[.]" Tr. at 1090.

Upon the arrival of aircraft 1, delay ensued. Although Mr. Nesbitt testified that work began immediately, a March 14, 1994 letter to him from WVAC, authored by Mr. Pentz, indicates that the tear down inspection did not commence at the end of January when the aircraft arrived, nor during February 1994. Instead, Mr. Pentz wrote that "[t]he start of the Tear Down Inspection was put 'on hold' until more detailed planning and coordination could be accomplished. The First Article Aircraft Schedule and the Progress Monitoring Chart are being replanned to reflect this delay. . . . The new start date for the Tear Down Inspection is March 14, 1994."

According to Mr. Pentz, plaintiff postponed the tear down inspection on aircraft 1 because WVAC simply was not in a state of readiness and did not have its procedures in place. Pentz Dep. at 161. This assessment followed a report by Norman Richmond, a Belfast engineer in the Operations Department, outside of PALS. Mr. Nesbitt testified that he sent Mr. Richmond to WVAC on February 1, 1994, to help WVAC put in place a progress monitoring system and a work scheduling system and to help create a line-balancing system. Line balancing, Mr. Nesbitt explained, "[is] something that you would look at in a manufacturing environment." Tr. at 1312. PALS had little experience with line balancing,

and "that's why [Mr. Nesbitt] asked Norman [Richmond] to go out and try to help WVAC." Id.

Mr. Richmond documented his trip in an undated report. DX 1328. He was not impressed with WVAC's state of preparation, noting that "[t]o date, the majority of the Air Centre's work would appear to be of maintenance type, with little thought as to how they would plan/organize/monitor & control the [C-23B+] work package, at operations level." He examined WVAC's current system for monitoring progress of the work, which made use of the Symix computer system, and concluded that "[t]his type of shop floor control for issue & monitoring of work may be suitable for the current maintenance & one off type repair / modification contracts, but it is not suitable for a production run type contract over a number of aircraft, i.e. the [C-23B+] contract[.]" He also stated that "[t]he capacity /ability of the Symix system to hold /process the volume increase of data & information, which will be present when the [C-23B+] is in full production, should be investigated in advance, to avoid system overload."

With respect to creating a monitoring system, Mr. Richmond advised the use of Progress Charts:

> A Progress Chart is created for the work content of each build stage. The work content for the build stage, as shown on the Progress Chart, must take the critical path operations into consideration, fitting them into the duration of the stage (Move Rate) . . . .
>
> The Progress Charts provide a highly visible & understandable means of monitoring & communicating progress, for everyone.

Mr. Richmond's advice continued:

> The production line must be set up as a series of stages, of EQUAL time duration. . . .
>
> . . . .
>
> Line balancing cannot be achieved effectively for the first ten aircraft because of the different build cycle duration for these aircraft.
>
> WVAC should try and rationalise & stabilise the aircraft build cycle at an earlier set number, to enable the line of balance to be operated much earlier.

> This will enable the build stages for each aircraft to follow sequentially, per stage, without overlap or delay between preceding & following aircraft.

Although Mr. Richmond's report primarily discusses what WVAC should do, he also made some pointed comments directed to Belfast:

> The lack of information from engineering, to date, with respect to work definition & content, job sequence, etc. for the [C-23B+] work package, at WVAC, has inhibited the production of any more than the first build stage progress chart, for aircraft Number 1.
>
> . . . .
>
> For the first progress chart, we have sequenced the work content for the first build stage on a/c. No. 1 from the limited information available for the early work content of the work package, in line with the sequence & dates generated by Engineering. . . .
>
> This is not the recommended sequence of steps to follow, in producing a progress monitoring system. The process of generating progress charts . . . requires the drawing up of the progress charts to be preceded by a critical path analysis of the complete work package. . . .
>
> Because we have not been able to base the first chart on the findings of a critical path analysis, I am not convinced that the chart which we have drawn for Aircraft No. 1, Build Stage 1, will accommodate the overall schedule requirements.

Mr. Richmond's report monitoring progress based on his February 1, 1994 visit to WVAC highlights one of many concerns about WVAC's ability to undertake the project during that time frame, all of which caused the postponement of work on aircraft 1. Concerns about WVAC's overall production planning also manifested during that time. In January 1994, plaintiff had tasked Mr. McCoy, Belfast's Proposal Manager, to be the WVAC on-site Program Manager. He drafted a report dated March 7, 1994, stating, in part:

> Progress in this area [production engineering] would appear to be still relatively slow, although the activity level had been higher in recent weeks. This is largely due to the fact that SHORTS Production Engineer, John Ballard had been supporting activities within the production engineering group. . . .

> . . . John has advised me that . . . he believes that the engineering department may be possibly twenty three (23) weeks behind program if they maintain the same manpower levels in this area.

Mr. McCoy nonetheless authorized a start-date of March 10, 1994, also observing that "[i]n general WVAC have been unable to display that they are capable of managing a contract of this size and I feel that we should generate a contingency plan in the event that they are unable to fulfill their [contractual] requirements." Like Mr. Ballard, Mr. McCoy was prescient.

WVAC's President, Mr. Long, responded by a March 8, 1994 letter to Mr. Spottiswood, Vice President of PALS, who also visited WVAC in February, explaining that production engineering suffered from "inadequate leadership," but that WVAC had hired an additional planner, bringing the total to four. Additional issues noted in this March 8, 1994 letter included WVAC's lack of proper government-property handling procedures, concerns regarding adequate floor space, and an emerging issue related to WVAC's financial stability: "The Compton family has reiterated their position to financially support the cash flow requirements of the [C-23B+], and other in-house programs."

When the March 10, 1994 start-date slipped, Mr. McCoy wrote to Mr. Pentz on the same day, stating that "[i]t is not Shorts intention to control by a start, stop work authorization, however WVAC must very quickly demonstrate to Shorts their ability to plan and control this major and complex contract." He pushed the start-date authorization to March 14, 1994, but only if WVAC addressed various deficiencies.

WVAC was required to amend its first article plan to account for plaintiff's decision to put "on hold" the "start of the Tear Down Inspection," as Mr. Pentz stated in his March 14, 1994 letter to Mr. Nesbitt. "WVAC acknowledges that the Production Planning/Preparation effort is beginning to lag, lacks focus and direction, and is under staffed." Mr. Pentz testified that WVAC's planning was "lagging" because WVAC "did foresee improperly timed application of resources to that function." Pentz Dep. at 161. He requested the BOM, which is the critical list of parts that Belfast was to furnish.

To alleviate these concerns, his March 14 letter reported the following:

> An additional Planner has been hired and has joined the C-23 team. This makes three Planners assigned full time to the Program. It is recognized that additional help is still needed. A complete review of the planning requirements for the program is underway. A detailed plan, schedule, for the

planning effort supported by a manpower profile will be ready for WVAC management approval by March 25, 1994.

WVAC's production planning was not all that was "lagging" while aircraft 1 sat idle in the hangar. Mr. Pentz also wrote that WVAC's direct labor hiring (direct laborers physically worked on the aircraft; indirect laborers included methods planners) also "continues to lag behind the plan." However, because WVAC only intended to have seven direct laborers working on the C-23B+ project from January 1994 to May 1994, 39/ the lag in hiring was a term he ascribed to WVAC's overall requirements – including other projects. Mr. Pentz testified that WVAC kept plaintiff informed of WVAC's other projects because "[t]he overall concern was the viability of the entire facility, because if you're lagging in the commercial area, for instance, . . . what does that do to that portion of the overhead?" Pentz Dep. at 160.

A March 24, 1994 program review held at WVAC reported that planning was still well behind schedule. Plaintiff consequently sent its own planners to WVAC, an unreimbursed cost.

Both Messrs. Nesbitt and McCoy at trial summarized these start-up difficulties as normal or to be expected in an undertaking of this size and scope. Nonetheless, the record reflects a growing realization that WVAC was not up to the task.

3. Tear down inspection of aircraft 1

The tear down inspection of aircraft 1 40/ finally commenced during March 1994, and Belfast was issuing detail design drawings. The tear down inspection began with pre-planned activities based on limited tear down instructions included in the SD3-60 maintenance manuals. It did not take long for WVAC to realize that the tear down inspection planning was deficient.

39/ The number of direct laborers was planned to start with seven and slowly rise until a peak in July 1995 of ninety-five laborers, then reduce. The labor complement planned for a particular month was a function of several factors, including the type of work, the number of aircraft being worked on during a given time, the cost, and the space limitations in or external to the aircraft.

40/ WVAC also commenced an earlier-than-planned start date on aircraft 2 during first article work, in May 1994.

As planned, WVAC went into the aircraft, removed all internal furnishing panels, completely took up the floors, and opened the entire aircraft. Mr. Ballard testified that it was at this point that WVAC realized that "the scope of work" was going to be much greater than originally anticipated. Tr. at 2492. This realization occurred particularly when WVAC began to remove system components to facilitate cutting the aircraft in half.

An early complication with systems was learning that removal of the air-conditioning to facilitate cutting the aircraft did not involve pulling up a floor panel, going under the aircraft, and removing a contained unit. Part of the air-conditioning was contained inside the fuselage, spanning its entire length. Other parts sat on the fuselage roof, external to the aircraft compartment. Almost 700 individually identified parts comprised the air-conditioning. Similarly, the hydraulics system, which raises and lowers parts and is installed at various locations, involved approximately 800 separately identified parts. The fuel system, including the fuel tanks, also called for approximately 800 parts. 41/

With the panels removed, and these systems exposed, Mr. Ballard acknowledged the impact on the expected scope of work: "[T]he task was not what was described in the WBS." Tr. at 2493. Mr. Nesbitt's "voyage of discovery" had begun. Tr. at 1108. The fundamental, and immediately apparent, problem was that, according to Mr. Ballard, the anticipated points at which parts of systems had to be removed to facilitate the proposed cut – which even at that time was not finalized – were not workable, as they would cut across/through systems. Mr. Ballard described the conundrum:

> [T]he systems could only be removed by establishing natural break points in the systems where, for example, where control rods were jointed, where control cables were jointed, where air-conditioning pipes were jointed.
>
> And it was not just a simple task of removing in the way of the cut, we had to trace back along the aircraft fuselage to establish where the natural break points were for these systems.

Tr. at 2493. Mr. Ballard then explained that the tear down became more involved than anticipated:

41/ Plaintiff demonstrated these three systems – the air-conditioning, hydraulics, and fuel – on six oversized exhibits. They were compiled from the IPC that identified all parts by number.

> It was more difficult to take [the systems] out because, as we started to look at how we were going to take them out, there were natural break points where we had to move back to, so when we identified where the break points were, where the systems were going to have to be separated, we realized that there were going to have to be structural removements to allow the systems to come out, there was going to have to be equipment removed to allow those systems to be removed in the fashion that we now realized that they were going to have to come out.

Tr. at 2495-96. The context of the impact of cuts was encapsulated by the pithy testimony of Mr. Cowan, Belfast's design engineer who became the Engineering Manager at WVAC: "We had never cut-up an airplane before in that sense." Tr. at 2991.

While the planning for the fuselage cuts increased the extent of system and subsystem removal, other significant developments and insights were also calling for increased system removal. A pivotal decision made in Belfast by the design engineers forced a rethinking of the extent of system removal. It involved the structural frames of the aircraft.

4. Situations encountered

1) Frames

During early 1994 the design engineers in Belfast were releasing incrementally to WVAC the detail design drawings, from which WVAC could create the WPSs that would instruct the mechanics on how to accomplish the actual modifications. Plaintiff also liaised with WVAC on the detail design drawings even before they were finalized; in April 1994 Mr. Ballard learned from Belfast what the detail design drawings required with regard to the frames, and he informed Mr. Nesbitt.

Mr. Cowan gave a primer on frames. The frames of the aircraft are steel support structures that go around the fuselage before the tail is jointed and the nose is on. Although the body, or fuselage, of the aircraft appears shaped and rounded like a cylindrical tube, it actually is built as four flat panels put together like a box. The skins and fairings are the external structures that surround the fuselage and, for aerodynamic purposes, make the aircraft cylindrical. The fuselage is supported by these steel frames, and each frame has four sectors, or sections: the sides, top, and bottom. The frames and frame sections vary in thickness depending on the structures that they are intended to support. The main fuselage in the SD3-60 aircraft (between the tail and the nose) had twelve frames, or forty-eight sectors. Plaintiff ultimately replaced twelve out of the forty-eight sectors.

The performance specifications for the C-23B+ dictated different load requirements than those of the SD3-60, so the frames had to support these additional loads. Belfast gave advance notice to WVAC that the detail design drawings would require removal of the SD3-60 frame sections and replacement with C-23B frame sections, rather than reinforcement. 42/ The problem was that neither WVAC nor Mr. Ballard, plaintiff's Methods Engineer at WVAC at the time, had expected or planned to replace the frame sections that Belfast was requiring. Instead, according to Mr. Nesbitt, "in the WBS, we thought the remainder of frames could be reinforced in situ[.]" Tr. at 1104. The discrepancy was a major and immediate cause for concern – so much so that Mr. Ballard testified that most engineering people at WVAC were talking about it "[w]ithin the next two or three minutes" of his first learning of it. 43/ Tr. at 2824. "[I]t was the topic of conversation within the engineering departments[.]" Tr. at 2825. The significant impact of having to remove and replace the frames, compared with reinforcement, Mr. Nesbitt explained, was twofold. First, removing the frames and working on them outside of the aircraft itself was an additional task, and second, more systems removal was required to access the frames.

42/ Mr. Bowyer described the document giving WVAC notice of the frame replacement as a "reference note," common in the aerospace industry, and was one page of what would probably be a small portion of the overall detail design drawing. Tr. at 2295-96. Reference notes were descriptions of a drawing designed to give a "heads up" about what the engineering drawing would require.

43/ A fax dated April 15, 1994, from Mr. Ballard at WVAC to Belfast memorializes his learning about the frames.

Within weeks of learning about Belfast's plan to replace the frames, and after some investigation, 44/ WVAC threatened to bring a claim against plaintiff for out of scope work.

44/ That investigation revealed a document that became defendant's Holy Grail at trial. It took on the name of its author, and was referred to throughout trial as the "Bobby Downie Document." The Bobby Downie Document began as a mystery, as the parties were unable to locate it and produce it for trial. Thus, trial proceeded by reference only through the faded memories about its text, until, on Day 12 of trial, the Bobby Downie Document surfaced during Mr. Cowan's testimony. Defendant trumpeted the document as proving that Belfast had planned replacement of frames long before contract award and thus was on notice of what would be a spiraling work effort.

The Bobby Downie Document is a ten-page engineering document with the common words "Frame Sectors – SD3-60/C-23B Comparison" across the top of each page. It describes several frame sections that required replacement for a SD3-60 to C-23B conversion. Mr. Bowyer explained in his April 26, 1994 Inter-Office Memorandum that WVAC had possession of this document and used it to prepare its proposal, including the technical aspects of the frame modifications. "[WVAC's] task description and estimate do not include the removal and replacement of any frame sections. However, the Shorts frame comparison document does give an indication that replacing of frames is required." At the time of the proposal, Mr. Bowyer "regarded [the Bobby Downie Document] as a differences list only[,] . . . a starting point for further engineering work to determine whether strengthening would be required." He concluded that "it appears that it was instead used as the basis for a simple approach to the modification design, where complete replacement is called up rather than any local reinforcing."

Plaintiff took the position that the Bobby Downie Document is insignificant because it relates to the C-23B, not the C-23B+. Mr. Cowan, however, stated in his "Design Engineering Support Group Status Report" for the week ending April 28, 1994, that Mr. Bowyer used the Bobby Downie Document to "form his technical portion of the bid to Shorts for the contract, but somehow ignored the 'replace frame sector' statements."

The court found compelling the deposition testimony of Mr. Mansfield, plaintiff's Engineering Project Manager preaward, that "[v]irtually from the start an agreement between design and planning, we decided we would replace the top frames and top skin. This was decided well before contract award." Mansfield Dep. at 19. The admission that plaintiff planned to replace frames prior to award lessens the significance of the Bobby Downie Document dispute because the issue is not whether plaintiff fully informed WVAC, but whether frame replacement was a consequence of the "voyage of discovery." It was not.

Mr. Pentz wrote an April 27, 1994 letter to Alan Coey, plaintiff's Contract Manager, stating:

> The emerging Shorts design of the C-23B+ Frame Reinforcement modification is significantly different from the design approach conveyed to WVAC during the planning and proposal phase. . . .
>
> . . . .
>
> These changes in design approach have the potential for significant increases in disassembly and installation hours/cost, tooling requirements/cost. Schedule may be affected as well. Accordingly, WVAC will expect an equitable adjustment to the contract if these impacts materialize.

On May 9, 1994, WVAC and plaintiff held a C-23B+ program review, with the frames issue on the agenda. The presentation slides indicate that WVAC gave plaintiff the results of its investigation, concluding that the work on the frames required by the detail design drawings represented an "increase in scope[.]" Plaintiff's witnesses testified that plaintiff believed WVAC had a valid claim, and Mr. Cowan observed in his April 28, 1994 report that "Shorts would seem to be 'exposed' due to the significant changes on the btm. frame sectors (further reinf.) which I understand have taken place since the [SOW] was agreed with WVAC."

The frames issue upset WVAC's planning and caused further delay. Mr. Ballard wrote to Mr. McCoy on May 12, 1994, stating that "[t]he fact that the planning effort on the frame reinforcement modification is well behind target with no resources as yet allocated to the task, and insufficient planners are available to match the requirements of the programme, challenges the integrity of the plan presented." He added that "[t]he full impact of the problem is difficult to assess[.]"

2) Roof

The second significant issue involved the forward roof of the aircraft. Shortly after the frames issue arose, WVAC and Mr. Ballard became aware that the forward roof must be removed and replaced.

The problem manifested during the tear down of the first aircraft. Shortening the aircraft by removing 36 inches of the fuselage called for removal of that portion of the roof. Mr. Ballard explained those 36 inches included part of the air-conditioning system and that the planners intended to remove and reposition certain components of the air-conditioning system. According to Mr. Nesbitt, SD3-60 aircraft contain two fuel tanks stored on top of

the aircraft roof structure; the wings actually sit on the roof, as well. To maintain the integrity of these fuel tanks, and to prevent the possibility of fuel leakage into the passenger compartment of the aircraft in the event of rupture, the roof compartment was completely sealed with Bostic, a sealant resembling a "thick glue." Tr. at 1117. The roof panel in some areas had a thickness of only 40/1000ths of one inch.

Mr. Ballard related what happened:

> The normal course of events that, if you would, remove the fasteners, the rivets, or whatever, that we could remove the components off the roof. . . .
>
> . . . [W]hen we tried to take these components off the roof, and this roof had been completely sealed, the adhesive qualities of the, first of all, the interface that we had between the components when we put them together, and now added to by the sealant that was on the roof, the roof would not surrender the components to us.
>
> So when we tried to forcibly remove them, it actually tore the skinned roof, rather than surrender the part to us.
>
> . . . .
>
> . . . [T]hey were baked on, they were frozen on, and they just wouldn't come off.

Tr. at 2518-19.

Mr. Nesbitt testified that the ultimate fix to this problem was simply to remove a large portion of the roof and replace it anew. 45/ As with the frames, WVAC was not happy with the additional work. Jeff Bryant of WVAC wrote to Mr. Coey on July 13, 1994, stating: "I need to know under what WBS in the proposal all this work will be accomplished on."

3) Knock-on effects

Similar to the frames removal, the need to remove a larger section of the roof precipitated compounding effects on methods planning. Additional systems removal required more planning. Because both the frames and the roof had systems running through them, such as wiring, fuel pipes, and flying controls, the need arose for methods planners to

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45/ Mr. Cowan also testified that "[i]n parallel, the design process was going through, and they made the decision to cut the roof, and around the same time, we were coming to the idea that that's a good idea." Tr. at 2997.

find appropriate points at which these systems, or parts of these systems, could be removed. Discovering additional planning needs also signified that the current plan for the next aircraft was deficient, as Mr. Ballard explained, so methods planners had to issue supplemental planning to bridge what was the original planning and what WVAC was discovering on the first aircraft. He testified that this involved extensive rewriting of the WPS's, and a May 24, 1994 letter from WVAC to Mr. Coey informed plaintiff that "WVAC is increasing the number of planners to the C-23 program in order to recover the writing of the work process sheets. . . . This will allow planning to recover and complete most of the C-23 planning in 4 to 6 months." WVAC's methods planning department grew to approximately eleven personnel during June 1994.

These compounding effects, which Messrs. Nesbitt, McCoy, Ballard, and Cowan called "knock-on effects" or "knock-on impacts," e.g., Tr. at 1208, 1913, 2512, 2995, went beyond requiring planning commensurate with the discovered tasks. Additional work required additional labor, but that was just the beginning. Every system or additional, unplanned part that had to come off the aircraft required more storage space, which at WVAC was a limited resource. Because the aircraft were government property, WVAC was required to implement government-approved identification procedures for parts on a larger scale than anticipated, and government quality control inspectors had to inspect the parts before they went into storage, not to mention testing when they went back into the aircraft. Another knock-on effect occurred by virtue of removal of certain system components, which would leave unremoved system components in the aircraft exposed and susceptible to damage. Mr. Ballard testified that "[t]here were bits of systems hanging all over the place, so it became necessary just to take the equipment specifically out of the aircraft. A, for accessibility and, B, because if they were left in the aircraft in that condition, they were going to get damaged." Tr. at 2497-98.

Storing the aircraft parts created even more problems. Larry R. Wright originally was the Avionics Manager and later the final Production Manager at WVAC. He explained that shelving used parts caused parts failures:

> A perfect example of it would be a vertical gyro whereby the rotor bearings are, have grease in them and what's during . . . their normal operation the grease migrates away from the bearing, okay, so that what happens as the gyro sits there on the shelf the grease that has migrated no longer protects the bearings and what would happen is you would fire it back up with dry bearings and you have got a failure.

Deposition of Larry R. Wright, Oct. 2, 2000, at 64-65. He elaborated on this point, as follows:

> Q. [I]f you put . . . something that has a bearing on it on the shelf, and you take it off however many months later, would you expect that it would fail?
>
> A. Yes.
>
> Q. . . . I guess there was no provision for when you take a used gyro out to automatically send it to an instrument shop to have the bearings greased?
>
> A. Actually once it was identified as being a problem, programs were put in place to make sure those components were sent out. It included gyros, prop governors, things identified early on in final production that were going to be a problem. A program was put in place and a decision was made to send them out.

Id. at 66-67. Although these problems stemmed from disassembling the aircraft, often they were not discovered until WVAC was preparing the aircraft for testing, during the "final production process," when WVAC would fix what was not working. Id. at 10-11. Mr. Wright explained that corrective actions "were added all during the process as [problems] were identified." Id. at 67.

Aggravating the parts problem, certain "one-shot" components, like gaskets and seals, could not be reused once removed. Tr. at 2502. The need for materials grew, which contributed to an expanding BOM.

More work also meant more time, but during the tear down inspection of aircraft 1 and the first few months of actual work, both Messrs. Nesbitt and McCoy still believed that plaintiff could keep the project on schedule.

5. Developments during late spring and early summer 1994

Beyond the frames and the roof, detail design drawings and other work requirements coming out of Belfast required work beyond what WVAC had bid in its proposal. Mr. Nesbitt wrote Mr. Mansfield on May 5, 1994, regarding a contractual requirement to complete any necessary service bulletins that had been applied to the commercial fleet of SD3-60s, but had not been incorporated by the owners of the donor aircraft. Mr. Nesbitt stated:

> We have always been quite relaxed on these, as is believed the aircraft operators would have already embodied these service bulletins. However, the

> remaining additional modifications will severely impact the programme and profitability on this contract.
>
> I must point out that Engineering were an integral part of the team that put the proposal together in the first half of 1993. This additional work was not highlighted and is therefore not priced into the proposal. WVAC will be looking for over and above payment for incorporating these. Unlike on the basic repair/overhaul over and aboves, where we get paid on CLIN 003 of the contract, this would have to come out of the bottom line. . . .
>
> We must remember that this programme entails secondhand aircraft going into WVAC, and a modified second hand aircraft coming out.

Mr. Nesbitt testified that this issue was resolved because plaintiff ultimately determined that some of the work called up for Mr. Mansfield's department would not be required. Mr. Mansfield, however, said that Mr. Nesbitt suffered from a "misconception" that Belfast "engineering were asking for more than we had previously asked for." Mansfield Dep. at 45.

A June 15, 1994 assessment of WVAC by Mr. Nesbitt pointed out major problems with WVAC's planning:

> [WVAC] estimate[s] the hours on 1st article planning at 10,461 and the [*sic*] date they have completed 1059 (10%). Their planning effort should have started in late 1993 and been completed in October/November 1994. This means they are attempting to do 90% of the work in 30% of their time (after achieving 10% in 70% of the time).

He continued:

> WVAC have now got 11 people in their planning office (although not all of these are planners). This is the number that should have been allocated to the programme from November 1993 and does not allow for the required recovery programme through to November 1994.
>
> . . . .
>
> Niels Andersen indicated that the intention of the Air Centre was to speed up the issue for the planning by simply issuing many of the processes as 'install to drawing.' It was pointed out that this would not cover the build when there could be up to 7 aircraft in work at any one time.

> This reflects my worst fears that even though the Air Centre might get the 1st article out in time, they will struggle to achieve the required cycle times required for the later aircraft, when the learning curve allowance (and the extremely generous cycle time on aircraft 1) has gone. This is something I have been pointing out to Dave Long from October 1993.
>
> It was also pointed out that what they are proposing, the amount of rewriting could be up to 70%.

The problems at WVAC prompted action by plaintiff, and two additional planners were dispatched to WVAC. Plaintiff also had a methods engineer from its planning department, Dennis Glover, examine the modified first article schedule along with Mr. Ballard. They suggested that WVAC should "introduce phased planning," as documented in a fax to Mr. Nesbitt dated June 21, 1994: "To introduce phased planning into the WVAC planning system three planning items were moved to the left." 46/

While plaintiff scrutinized and addressed WVAC's planning deficiencies, Belfast itself was the cause of other problems having to do with late parts supply. Belfast was contacted regarding delay in parts supply to de Havilland, the subcontractor manufacturing the tail section, in June 1994. Mr. Nesbitt wrote to Chris Masterman, his superior at PALS, on June 4, 1994, stating that "[a]lthough we have no excuse on some of the critical shortages, this situation has not been hidden." Nonetheless, Mr. Nesbitt testified that such shortages are "normal for a first build[.]" Tr. at 1445.

Mr. Masterman wrote on June 7, 1994, to de Havilland, regarding the issue and a slippage in de Havilland's delivery date of the first tail to WVAC: "I appreciate that there is a perception that any slip in the Programme can be blamed on shortages of parts coming from Belfast, and I do readily accept that there are currently some critical shortages that will affect the Programme if effective work arounds are not developed and implemented."

6. Exercise of the option for additional aircraft

In the midst of all these activities, ATCOM was requesting extensions on its deadline to exercise an option for an additional ten aircraft beyond the twenty C-23B+s called for. Mr. Pentz explained that WVAC was in a position to accept or decline to perform the option

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46/ A task "moved to the left" would occur earlier than prior planning; it refers to the schedule of tasks which can be drawn on a chart beginning on the left and running to the right.

part of the contract. He had a role in advising WVAC management on whether to accept the option; and, on WVAC's behalf, he wrote a June 29, 1994 letter to Mr. Coey expressing that

> WVAC is very interested in obtaining the ten additional C23B+ aircraft under the option. However, there are several areas of concern that must be addressed prior to extending the option period.
>
> Growth in the "scope" of the modification is of major concern. As more detailed engineering is released and the technical definition becomes clearer, several areas of significant additional effort have been raised.

Plaintiff, however, was, as Mr. Nesbitt put it, "quite happy to accept the option aircraft[,]" because, even with all the problems discovered thus far, "[a]t this point in time, we still thought we could deliver the aircraft, the first aircraft on the basic contract schedule[.]" Tr. at 1450-51. For its part, WVAC, per Mr. Pentz, could not resolve the scope of work problems; he stated that "[w]e were pretty well convinced that we were going to be in the claim mode either immediately or in the near future." Pentz Dep. at 167. Plaintiff accepted the option quantity in October 1994.

7. Problems during summer and fall 1994

During summer 1994, knock-on effects continued to create problems, the option aircraft were still on the table, and WVAC's relationship with plaintiff began to sour.

The SD3-60s were not configured identically, so WVAC, not Belfast, was in charge of converting the SD3-60s to the C-23B standard, which included determining what parts could be used from the donor aircraft and which had to be manufactured. The volume of unplanned parts coming off the aircraft generated confusion regarding who was responsible to define which parts had to be scrapped and which parts were "serviceable," or capable of being reused. Mr. Cowan wrote a July 27, 1994 letter to Mr. McCoy, complaining that the detail design drawings were inconsistent and failed to identify which parts were serviceable and which were not. The next day, July 28, 1994, Mr. Glover wrote to Mr. Mansfield stating that WVAC's methods planners needed guidance from Belfast on the serviceability of parts. He also complained that "[t]o say it is a planning function to identify what bits stay, what bits are new and what bits are discarded is not true." Mr. Mansfield circulated a memorandum dated August 29, 1994, responsive to Mr. Glover's concerns, replying, in part, as follows: "We have never stated it is a Planning Function to define the changes. Design have defined the change and it is planning[']s function to issue instructions on how that change is embodied."

The parties discussed several concerns during an internal review meeting on August 17, 1994, at WVAC, which included: proper procedures for identification of government-owned property; an insufficient number of indirect laborers; parts tracking deficiencies; and WVAC's failure to provide plaintiff with the list of parts requiring repair – which the meeting minutes reflect was plaintiff's "major concern."

At this time, August 1994, aircraft 2 was in the hangar being worked on simultaneously with aircraft 1, and aircraft 3 was to be delivered to WVAC by the end of the month. With the arrival of the two jigs during the summer, WVAC was able to place aircraft 1 in jig and had completed both the rear and forward fuselage cuts. Frame planning was 95% complete, but the roof planning was only 50% complete. No reassembly of aircraft had taken place.

The frame replacement that WVAC was performing at the time, under pressure from the schedule and plaintiff, continued to fuel WVAC's posturing over its claim against plaintiff. Mr. Nesbitt wrote to Mr. Brooks of Shorts Inc. on August 9, 1994, stating that plaintiff did supply WVAC a document that would have alerted it to the need to replace certain frame sections during its proposal preparation, the elusive Bobby Downie Document. See *supra* note 44. Mr. Nesbitt also commented on the extent of WVAC's potential claim involving issues unrelated to the frames:

> In addition to the frames, we have been advised that their planning have identified other recurring activities, which they perceive as "out of scope". . . .
>
> What we will not pay for are in efficiencies at the Air Centre. For example on their planning hours over the last 6 months they have completely changed their team and are now a lot more efficient. However it was only in March that [WVAC] tabled their 1st article plan (about 3 months behind schedule), which they then had to completely revise and reissue in May. There must have been thousands of wasted manhours in this area.

Mr. Pentz wrote plaintiff in September 1994 detailing a claim based on delay in receiving parts from Belfast. 47/ Plaintiff's delay in providing WVAC with frame parts caused a delay, serious enough to support a claim, with the first major modification task of

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47/ The document itself was not admitted in evidence, although Mr. Pentz referred to it during his deposition.

the contract. Pentz Dep. at 173-74. Plaintiff wholly rejected WVAC's claim on late parts delivery, blaming the problem on WVAC. Mr. Pentz discussed the problem, as follows:

> [T]his whole kitting [48/] sequence was kind of a situation where Shorts made the rules as we went along.
>
> The idea was that they were to provide the parts, so we figured that we get the parts either in kits for a particular task, or we would get the parts in plenty of time that we could assemble them. Well, then, lo and behold – that's what we assumed. We shouldn't have assumed that, because Shorts comes out of the blue, and tells us, tell us what parts you need and when you need them. Well, hell, we don't even know what parts exist that were needed, because the engineering is going on and identifying the parts. So, you know, it was kind of a chicken and an egg type of thing that was going back and forth between us, and so that's what they're basing their hassle on. But my position was, hey, you got a major, major hole here, and we're not ready to start.

Pentz Dep. at 177-78.

In September 1994 WVAC was about to be acquired by Bombardier. As Mr. McCoy explained, this was the only viable alternative open to plaintiff for managing the project.

8. Bombardier's acquisition of WVAC and post-acquisition changes

By October 1994 WVAC had completed the tear down of aircraft 1, cut the aircraft, and removed the 36-inch section of the fuselage. Work on aircraft 2, which was received into the facility in the beginning of June 1994, was complete to the same point; both aircraft awaited reassembly. Aircraft 3, which arrived in early September 1994, had not yet entered the tear down inspection phase. Aircraft 4 would not arrive until November 1994.

While work on these aircraft was taking place, and during all the problems centering on the parts, the frames, the roof, and other systems, including WVAC's claim posturing, the Compton family was considering pulling its finances out of WVAC. Mr. Nesbitt first learned during the summer of 1994 that the Compton family wanted to sell WVAC. He agreed with defendant's characterization that, in order to keep WVAC a viable entity, and because no

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48/ See *supra* note 19. Mr. Ballard opined that WVAC was slated to do the kitting, but he only speculated that it was the assembly of the kits themselves.

other subcontractor could be used to do the C-23B+ project, Belfast and Bombardier decided that Bombardier should take steps to acquire WVAC. See Tr. at 1469.

When Belfast took over WVAC's operations on October 17, 1994, the WVAC claim did not disappear. Instead, as part of the acquisition, WVAC was compensated in an approximate amount of $200,000.00.

The acquisition signaled major changes for WVAC. Initially, Bombardier reorganized the entire management team. Mr. Nesbitt was appointed General Manager. The accounting department underwent changes to accommodate the Bombardier accounting practices. Messrs. Bowyer and Pentz were retained. Mr. Nesbitt testified that, after the acquisition, WVAC's personnel became approximately 60% American and 40% Belfast. Mr. Ballard took charge of the Methods Engineering Department, so his role changed from a permanent liaison engineer supporting WVAC's methods department to the manager responsible for it. Plaintiff conducted an assessment of not only the C-23B+ program, but all other work ongoing at WVAC, and made several determinations on how to proceed; indeed, plaintiff had just inherited every one of WVAC's problems.

Mr. Ballard recorded a decision on October 18, 1994, to substitute aircraft 2 as the first article "[i]n order to minimise the impact of shortages on the aircraft delivery schedule[.]" He explained at trial that aircraft 1 was an older aircraft, which required more parts than aircraft 2. Plaintiff believed that making the switch would allow it to meet the delivery requirements. On the same date, plaintiff held a meeting, the notes of which reflect that "urgent action" was required on the task of recruitment: "Six month action plan[.] Need to ramp up very quickly." Mr. Nesbitt testified that the "ramp up" in labor was to meet all of WVAC's workload, not just the C-23B+ requirements. Tr. at 1483. According to a summary chart, WVAC at that time had thirteen direct laborers on the project (versus twenty-one planned).

Mr. Nesbitt reported to Belfast on October 28, 1994, announcing the change on the shop floor to two eight-hour shifts, with "no weekend working on the [C-23B+], until it is fully supported with parts." The previous system at WVAC involved a seven-day week with two ten-hour shifts. He also commented that the previous system had "a high level of unnecessary overtime[.]" Mr. Nesbitt unsuccessfully attempted to recruit Bobby Gilmore, a production director who managed operations and directed the C-23A and C-23B manufacturing programs, for WVAC: "This leaves us with a major problem. The previous management have left this place in a mess and we need a strong and experienced Operations Manager. I cannot move Stephen McCoy from overseeing the Programming Office."

Regarding parts issues, Mr. Nesbitt noted: "As previously reported, the area of purchasing/production control/stores lies at the heart of most of the major problems at the Air Center. The present Manager, Jon Curry, is not coping." Mr. Nesbitt testified that parts supply was "one of the areas that were first hit, controlling parts, controlling stores[.]" Tr. at 1493-94.

Parts supply itself was a major concern at that time. A memorandum by one of plaintiff's personnel (Mr. Nesbitt's initials appear on it), entitled "C-23B+ Part Shortages at WVAC," dated October 31, 1994, noted that WVAC was behind program ten to twelve weeks because of ongoing late parts supply: "Over the last 6 weeks over 70% of the promise dates from all suppliers have been missed. Mostly during the due diligence at WVAC, when Operations were not being pressurized. They appear to have taken their eye 'off the ball'."

Mr. Nesbitt wrote to Robert N. Lyle, then General Manager of WVAC, one year later, on November 28, 1995, documenting the problems identified during the November 1994 time period. Several problems concerned WVAC's labor, prominent among which was the concern that WVAC was using too many subcontract engineers (37%), and that WVAC "lack[ed] skilled labor," described in Mr. Nesbitt's November 28 letter, as follows:

> Because of WVAC's location and the historical lack of aerospace activity within the West Virginia area, WVAC has experienced problems recruiting locally available skilled labor and have needed to attract personnel from outside the region. However the labor rates currently paid for shop floor directs at WVAC is considered low. This was recognized by WVAC who had intended to increase some labor rates by up to 10% in order to retain and attract employees.

Although plaintiff raised wages by 4% immediately after takeover, Mr. Nesbitt conceded that WVAC always paid less than other local employers of skilled labor and, consequently, that labor shortages plagued contract performance.

Methods planning took an entirely new direction. Plaintiff decided after acquiring WVAC that the reassembly work of the aircraft would replicate the manufacturing process for the C-23B that Belfast had utilized years prior. Due to this approach, and based on plaintiff's assessment that the Methods Planning Department was "severely stretched," Tr. at 2551, Mr. Ballard asked Belfast to consider taking over the planning of the reassembly work – stages 3 through 5, a request to which Belfast agreed. WVAC's prior work on creating WPS's for those stages, all done by hand, was transferred to Belfast by November 1994, and Belfast began working on planning for reassembly, as noted by a document titled "Planning Status Report at 18th November 1994," included in a WVAC Unit Monthly

Review Data Pack dated November 22, 1994. This latter document commuted that "[t]he C-23 hurdle of the non-routine maintenance seems to be going well at this time. Working relations with the government rep is good."

By the end of 1994, five aircraft were at WVAC, the first tail from de Havilland was delivered to WVAC, frame modifications were in progress on aircraft 1 and 2, and aircraft 3 and 4 were undergoing tear down inspections. And, despite the issues involving the parts delays, methods planning, the frames, and the roof, the WVAC Monthly Report for December 1994 indicates – and Mr. Nesbitt confirmed – that plaintiff believed that it still would meet the delivery requirements.

In January 1995, however, that optimism was undermined with the discovery of yet another major problem in the planning involving the joints. While aircraft 1 was in the jig, after the cut was made, plaintiff attempted to rejoin the aircraft and found that the two halves did not align.

9. Problems encountered post acquisition

1) Joints

The shortening of the aircraft by 36 inches necessitated realignment of the fuselage and rejoining the two impacted parts at the cut. The metal sides of the aircraft had to be rejoined as an exact match, as the integrity of the aircraft structure was at stake. The four panels of the fuselage were comprised of corrugated sections. And each corrugated part – Mr. Cowan, Engineering Manager for the C-23B+, explained that there were approximately eighty-eight corrugated parts in total – had to line up exactly. For the actual connection, as Mr. Nesbitt explained, to ensure the strength of the rejoined sides of the aircraft, a metal strap, called a corrugated buttstrap, would be placed over the connecting point, which would be heated and basically "glued," thereby strengthening the connection point. When plaintiff attempted to rejoin the sides with the straps, Mr. Nesbitt related that plaintiff faced a "complete mismatch." Tr. at 1126. The metal did not fit together properly. 49/ Mr. Cowan

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49/ Presentation slides from a March 15-16, 1995 Program Review depict that plaintiff informed ATCOM that "corrugated skin buttstraps . . . drawing incorrect." There was a design problem with these buttstraps, which a February 1995 WVAC Monthly Report indicates: "A major problem has been encountered on the 1st aircraft. On the top rear joint, corrugated butt straps fitted were found to be incorrectly designed. These will have to be replaced." Mr. McCoy testified that this design problem did occur in connection with the joints.

testified that, while plaintiff had experienced "minor problems with joint alignment" in new aircraft manufacture in the past, some amount of misalignment was acceptable – for example, a mismatch of 30/1000ths of an inch instead of 20/1000ths of an inch. Tr. at 2991. That degree of mismatch, according to Mr. Cowan, "was a little bit bigger than we expect[ed], but not 10 times, which is what we had to deal with quite a lot of the time in [the] B+." Tr. at 2991-92.

He recounted the litany of adjustments:

> [T]here were two issues really with the joints. One is the alignment of the corrugated bits of the old panel and the panels, and obviously, to make the joint strap fit properly, they have to be aligned very closely. And we're trying to align 88 of these in four different planes, in effect. You're trying to align all four sides of the airplane all at once.
>
> So really, we were adjusting the nose fuselage up, sideways, everything, trying to get those four sides of the box to line up, as well as the 88 corrugations all the way around. . . .
>
> The second issue was also making sure that the joint was cut correctly, so the two sides, the two edges came together as closely as possible without touching. So we had to get a joint, a gap between the two pieces of the airplane of typically 40/1000ths of an inch.
>
> So the combination of adjusting a complete four-sided box to match another four-sided box, the corrugated skins on each of the four sides aligned, and getting the joint faces on the four sides all within 40/1000ths of an inch, that would be a bit more, made it hard to get it so it matched. The compromise of all those things together was a challenge.

Tr. at 2988-89. The location of the cuts of both the forward and aft fuselage impacted the extent of the misalignment. Mr. Cowan testified to the magnitude of the difficulty in rejoining two sectors of used aircraft:

> [W]here we decided to cut the fuselage, and I was part of that decision, was to make it easy to cut. Because if you try and cut it where there is an existing frame, obviously, you're going to damage that frame.
>
> So you want a bit of area where you can put a saw in and not have a problem and also easy to mark and dimension and measure, so you can put the

> saw, the line for the saw in the right place in these. Unfortunately, that meant that, between frames, the corrugations tended to move in shape, tended to move, had moved during the original production build. So the corrugations aren't a perfectly straight line. They're in the right place at each of the frames because that's how they were put together and made as a brand-new panel when we were building the aircraft originally. Now, in-between those two frames, you have a little variation. And when I say, "little," I think the worse we came across was something like 3/8th of an inch, .375 of an inch, maybe a little more.
>
> That's a massive mismatch to try and deal with . . . . So on one airplane, you might have one side 3/8ths of an inch mismatched, the top panel perfect, the other side a quarter of an inch mismatched, the bottom perfect.

Tr. at 2990-91.

The solution was to set the aircraft into position, at which point plaintiff could ascertain the exact extent of the mismatch, which varied with each aircraft. Mr. Cowan explained that plaintiff would measure, for example, the height of one panel compared to the adjoining panel. Then, plaintiff would use a joining strap, cut to size, that would adjoin the two panels; the larger the height difference, the wider the joining strap in order to minimize the rate of change and reduce shape change.

As with every other problem, the joints issue caused knock-on effects. Thus, the joining straps wider than standard had to be manufactured, and procurement took time. Mr. Nesbitt related:

> [L]ike every problem, we had to get the engineers down. The engineers had to come up with a repair. Then the methods engineers needed to plan it. And, I mean, apart from the impact it had on the schedule, we had to stop work whilst we found the issue. It drove the parts up because we needed new parts. We had to create special parts to repair the aircraft.

2) Continuing problems in early 1995

The problems, including those involving parts supply from Belfast, continued into 1995. Laurel Technologies ("Laurel"), the subcontractor for avionics, wrote to Mr. Nesbitt on January 20, 1995, complaining that Belfast deliveries were "far behind." Mr. Nesbitt's notes of a February 13, 1995 meeting between plaintiff and Laurel indicate that plaintiff

believed "[Laurel's] claim for additional monies through late supply of parts is strong." 50/ De Havilland also complained to plaintiff regarding failed parts deliveries. Its letter of February 6, 1995, stated, in part: "What remains is a litany of slipped delivery dates and unacceptable promises. This situation has caused an unnecessary expenditure in hours due to work-around's and delays." De Havilland complained that plaintiff had made separate agreements with de Havilland to recover the parts slippages, but "Shorts has been unable to meet either of these agreements."

At the same time, Belfast had been issuing the planning for stages 3 through 5 incrementally, based on the EPR's used for the prior C-23B build. The planning that WVAC received, according to Mr. Nesbitt, could not be applied to the aircraft. He sent a January 26, 1995 fax to Mr. McFadden, Manager of Manufacturing Engineering in Belfast, voicing this complaint: "On the planning sent to date, all that has happened is that the existing SD3 and Sherpa planning has simply been lifted and put out to WVAC. It has not been adjusted to suit the required build." He also noted that WVAC only received half of what should have been the complete planning of stage 3; he continued: "A computer problem is being blamed for this delay but unfortunately, the problems are more fundamental than that. Major errors are being found in what has been sent." Referring to the decision to send the planning of stages 3 through 5 to Belfast, Mr. Nesbitt concluded:

> The manhours given to Belfast were for the full planning of the remainder of the task, not already planned at WVAC (Stage 1 and 2). Quite frankly, if we had known the standard being supplied and the amount of work still required at WVAC, we would have kept the planning here and struggled on. It would have saved the company money.

The February 15, 1995 C-23B+ Program Review includes a chart entitled "Major Concerns," followed by action plans, which included the following: "Parts Supply to DeHavilland now a very serious problem that is jeopardizing future deliveries and the overall programme[;]" and, referring to WVAC and ATCOM, "[r]ecovery schedule and what do we tell the customer."

WVAC trouble and parts trouble continued. A March 17, 1995 memorandum drafted by a WVAC engineer stated that WVAC was having problems with "return to aircraft parts"

50/ Laurel, in fact, pursued a claim against plaintiff, which Mr. Nesbitt testified had "nothing to do with late parts . . . it was the fact . . . that additional work generated parts requirements with infringed lead times. . . . [The claim] was increased work." Tr. at 1508. Plaintiff settled that claim.

("RTAC"), specifically, "kits for Work Procedure Sheets are hitting the shop floor short [RTAC]." The problem also involved improper identification of RTAC parts. Although Mr. Ballard was working to put a parts process in place, the problem of improper marking and storage of these parts persisted throughout 1994 and into 1995.

3) March 1995 ATCOM meeting in St. Louis

While ATCOM personnel were present at WVAC during the project, and ATCOM was aware of the problems as they developed, it was not until a March 15-16, 1995 program review in St. Louis that ATCOM and plaintiff confronted the fact that the program was delayed. It was then that plaintiff acknowledged a schedule problem, although Mr. Nesbitt believed that plaintiff could recover. And, according to Mr. Nesbitt, "it was quite an emotional meeting[.]" Tr. at 1203. He testified that "in 32 years in the industry, it was one of the most difficult meetings [he had] ever been at with a customer[.]" Tr. at 1200.

The minutes of this March meeting, dated April 13, 1995, document that plaintiff informed ATCOM that the delivery dates for aircraft 1 through 14 would be late by decreasing slippage amounts – from an almost three-month delay for aircraft 1 and 2, to less than one-month delays for aircraft 11 through 14. Plaintiff planned on recovering to the original delivery schedule by aircraft 15. At the time, according to Mr. Nesbitt, plaintiff believed that the joints were responsible for this delay, and the meeting minutes indicate that engineering presented ATCOM a detailed description of the joint problem.

Presentation slides used during that meeting, reproduced in the minutes, describe how plaintiff formally presented its acquisition of WVAC to ATCOM:

> Responsibility for this program was WVAC's with Shorts technical and management assistance. During 1994 it became apparent that progress on the contract was extremely slow and the organization was experiencing severe difficulties.
>
> These problems ultimately led Shorts to enter into a major financial investment and purchase of WVAC to protect the [C-23B+] program.
>
> . . . .
>
> The initial and most important activities undertaken by Shorts upon the takeover was to assess the overall position and take immediate steps to stabilize the business, assure customers/suppliers and provide time to launch a professional business plan that would guarantee long-term success.

One slide, entitled "What Did We Inherit?" listed the following bulleted phrases in response: Poor Management, Lack of Manpower, Lack of Production Resources, Restricted Storage Space, Human Resource Issues, Part Shortages, and Cash Flow Difficulties. Other slides described the "actions taken to address these problems."

The minutes of the March meeting also note that "ATCOM is not pleased with the delay to the program and has indicated that considerations are expected." ATCOM "read [Mr. Nesbitt] the riot act," Tr. at 1201, demanded compensation, and threatened termination for default. ATCOM issued a notice dated April 13, 1995, that progress payments to plaintiff were suspended due to delinquency. According to Mr. Nesbitt, "even though they knew we were a supplier that was in severe trouble, they stopped our progress payments. They stopped the lifeblood coming to the program, which is a clear message of the threat for termination for default." Tr. at 1203-04.

4) Parts and labor issues

A WVAC April 1995 Monthly Report indicated that the parts supply problem was causing increased program costs:

> Increased costs are now being incurred by the parts supply problem, through having to do work arounds and stop/start situation on job. Eventually, this will have a serious impact on the operating plan, through firstly waiting time and secondly increased overtime to try and recover schedule. . . . [A] high percentage of promise dates are being missed[.]

Plaintiff decided, as noted in this report, that "[t]o help overcome the problems, WVAC have agreed to manufacture the majority of parts added recently by Planning." The report continued: "This leaves the majority of shortages as parts which have been on the basic [BOM] from the third quarter of 1994." In other words, Belfast as of April 1995 still had not provided parts identified by WVAC as needed from July to September 1994.

A C-23B+ Program Monthly Review dated May 3, 1995, noted continuing problems with the parts on the first article; shortages holding that aircraft in the jig could cause delays for subsequent aircraft intended to enter the jig. Regarding the first article, the Monthly Review stated that "[c]oncessions [documents that describe a nonconformance and how it is to be fixed, or approved plans to correct deficiencies] appear to [be] the big hold up at this time." Another memorandum, dated May 15, 1995, from Mr. Masterman in Belfast to Mr. Nesbitt, admitted that "[t]he process of identifying, ordering, progressing, shipping, storing

and issuing parts for the [C-23B+] programme – for [de Havilland], Laurel and WVAC is clearly in need of major overhaul both at Belfast and the parts' users."

Mr. Nesbitt testified that in May 1995 he traveled to Belfast to address the parts problem, the cause of which he ascribed to WVAC's asking Belfast for parts with "severely infringed lead times" and to the need to supply "an awful lot more parts than . . . originally envisaged." Tr. at 1538. Belfast assigned more personnel to the task.

WVAC held a management meeting "to discuss the lessons learned over the first six (6) months since the takeover[,]" as Mr. Nesbitt reported in a May 17, 1995 fax to Belfast. He explained that "[m]ost of the issues are internal to WVAC," although he conceded that "a number of the issues involve Belfast." One issue was contract management. "[T]he present method of managing the contract is not working (i.e. with all the main management team in the U.S. and so many issues still in Belfast)." Mr. Nesbitt also discussed a parts supply issue: "[I]t is strongly believed that [the Belfast parts supply team] . . . are underesourced. Faxes are not being answered, telephone calls are not being returned and the staff themselves admit they cannot cope."

Mr. Nesbitt testified that Belfast "couldn't cope" because it was "ending up with over four times the number of part numbers required than what [plaintiff] originally set off envisaging on the program." Tr. at 1543. Thus, Mr. Nesbitt concluded, "[o]f course, there were parts problems[,]" and "[o]f course, there were planning problems[.]" Tr. at 1545. Despite the parts problems, even by June 1995, plaintiff had yet to establish a dedicated parts team in Belfast. Also, by June 1995, plaintiff again informed ATCOM of schedule slippages and proposed another delivery schedule.

Plaintiff's formal request to ATCOM to extend the delivery dates was made in a letter from Mr. Coey dated June 22, 1995. Acknowledging that there would be no recovery to original delivery dates on any aircraft, plaintiff asked ATCOM to allow ten weeks out of twenty-five weeks "as justified as an increase in the existing workscope based on the allowable Over and Aboves." Mr. Coey explained that "the average effect of the Over and Above maintenance / repair activity (by hours), caused a 30% increase in production time." By bilateral modification, P00010 incorporated plaintiff's proposed delivery schedule, effective August 11, 1995. ATCOM allowed the modification to the schedule with a charge-back of approximately $55,000.00.

Employee retention joined the problems besetting WVAC in June 1995. The notes of a senior management meeting held on June 19, 1995, identify the problem as "[l]osing good employees." Two "critical reasons" were given for the problem: (1) "Uncertainties (i.e. Will I have a job after [C-23B+] and ARL?)[,]" and (2) "Wage difference (i.e. must pay

one level to hire, while present employee being paid less)." The actions to address this problem included the following: "Exercise to be done to analyze how much it would cost to level pay on the floor." June 1995 was also a period with continuing first article difficulties involving planning, continued parts supply, and labor – all of which were recognized in an internal WVAC presentation on September 3, 1995. Major changes, however, were about to occur.

10. Fundamental changes with action plan and tear down of aircraft 9

When the build on the first article was almost complete, plaintiff reevaluated the program, having had the benefit of its experience with the first article and having realized that the process required fundamental restructuring. As documented by the minutes of a management meeting held on September 21, 1995, plaintiff transferred the C-23B+ contract from the responsibility of PALS to the Aerospace Operations Division ("Operations"), which reported to Mr. Brundle, the head of Aerospace Operations. Operations then dispatched, according to Mr. Nesbitt, "a very senior team." Tr. at 1194. Messrs. Brundle and McFadden traveled to WVAC to create an "action plan." Mr. Brundle also detailed Bobby Gilmore, the production director who had headed the C-23A and C-23B manufacturing programs.

Operations worked on an action plan to implement a key decision by plaintiff: conversion of the modification activity at WVAC into the production line used in Belfast manufacturing operations. The action plan, dated September 25, 1995 (the "September 1995 Action Plan"), included a set of defined, far-reaching tasks to "productionize" the facility, as explained by Mr. McFadden, who, post-takeover, directed the methods activities on the program. The September 1995 Action Plan fundamentally restructured all aspects of the program, including the tear down, which, according to Mr. McCoy, corresponded with "a realiz[ation] that the approach that we were taking on those initial aircraft wouldn't accommodate a successful remanufacturing effort or a production line, as was required for this project." Tr. at 1676.

The overarching goal of the changes to come was to meet the schedule requirements. But the September 1995 Action Plan also addressed other problems at WVAC, including what Mr. Brundle explained as "high labor turnover [and] high degree of inexperience[.]" Tr. at 3948. Mr. Brundle made a difficult decision in September 1995 to stop all commercial work coming into WVAC. This decision, in turn, contributed to the problem of labor retention, because employees feared that they would be terminated when the ATCOM project was completed.

Mr. McFadden testified that the September 1995 Action Plan embodied five main steps to create a series production line based on defined known work. First, plaintiff

implemented a "controlled structured teardown" of aircraft 9, the next to come on line. Second, plaintiff recreated estimates in order to organize the production lines, including new assessments of the learning curve. Third, plaintiff physically reorganized the production line, Mr. McFadden explained, "so that it could match . . . the work flow that we were defining." Tr. at 3388. Fourth, plaintiff "introduce[d] a governance system to then start to drive the line in a drumbeat" – Mr. McFadden's unique contribution to enhance production efficiency. Id. Fifth, plaintiff improved logistics and parts supply to keep pace with what would be a "fast-moving line." Id.

1) The controlled tear down

In September 1995 the rebuild of the first article gave plaintiff the benefit of discovering many of the problems that it had not anticipated when the work on the project began, particularly the amount of system removal and the process of reinstallation. The first step of the September 1995 Action Plan was to complete a tear down of an aircraft with the goal of creating proper tear down procedures for all aircraft to come on line. Another objective, as Mr. McFadden testified, was to create as common a product as possible that would enter the production line. Mr. McCoy described the initial step as "go[ing] back to basics and start[ing] the tear down inspection in a fashion that would facilitate the remanufacture of all the aircraft." Tr. at 1675-76.

Plaintiff conducted the tear down in a newly leased hangar, the Hope Gas Hangar, because WVAC lacked sufficient space and because, as Mr. Ballard termed it, plaintiff needed a "controlled clinical environment" that would allow for careful control of each part taken off the aircraft. Tr. at 2564. Mr. McCoy related that, during the controlled tear down of aircraft 9, "[o]ur methods group basically lived down beside the aircraft and worked hand-in-hand with the technicians on the shop floor[.]" Tr. at 1677.

Along with the implementation of a controlled tear down of aircraft 9, the September 1995 Action Plan included the stoppage of other tear down activities on other aircraft, instructing: "No further break-down of aircraft until planning and stores situation under control."

2) Revision of estimates; standard hours; learning curve assumptions

The second step of the action plan was to create a newly revised work estimate based on the work content as ascertained from the build of the first article; the "lessons learned" up to that point, as characterized by Messrs. Nesbitt, McCoy, and Haggerty; and the controlled tear down of aircraft 9. Plaintiff dispatched Billy Collins, an experienced methods engineer, to WVAC to address time estimates and learning curve assumptions.

The estimating work between October 1995 and January 1996 made use of all WPS's known at that time. Messrs. Collins and Nesbitt, who assisted with the estimates, suggested changes to the learning curve originally used in WVAC's proposal. The minutes of a meeting held on November 15, 1995, noted their initial findings: "The standard hours are to be run again showing basic at set 40. Also showing 85% learning curves and 80% curves." A document entitled "Production Hours," dated December 5, 1995, states that the "logic" was an "80% Learning Basic @ 40th Set," – an 80% learning curve with a set point of 40 (all learning achieved by the 40th hypothetical aircraft). This reevaluation had the effect of increasing the number of hours per task, whereas WVAC estimates, carried forward in plaintiff's proposal, loaded labor hours on the first ten aircraft.

3) Productionizing the line; physical reorganization; the "drumbeat"

Operations applied its expertise in aircraft manufacturing and created a production-line environment at WVAC based on plaintiff's Belfast operation. Productionizing the activity at WVAC entailed physically changing how the work was performed on the shop floor and how the aircraft moved through the facility. The substantial changes began with changing the physical layout of the work process at the facility. According to Mr. McFadden, the layout prior to the controlled tear down of aircraft 9 basically was intended for a static build, *i.e.*, other than moving the aircraft into and out of the jig, the aircraft did not move, and laborers worked around the aircraft. A production line involved the opposite: Laborers and technicians remained at several stations, while the aircraft moved from one station to the next like an assembly line. The September 1995 Action Plan called for reconfiguring the line to a multi-station production line.

Plaintiff intended the production line to move like a "drumbeat," which requires defining stages of equal duration to create a "balanced line." Tr. at 3422-23. Mr. McFadden explained:

> [T]he drumbeat is what you create, in a sense a moving line, where each stage [of work] follows the other . . . . The important thing about this is that each of the stages you define, to define an aircraft, must be of equal cycle time, because if they don't, the drumbeat won't work, it gets out of sync.
>
> And that's where we do our network analysis at initial stage, to actually establish what we call a balanced line, so that each stage, while it may have different values of content of work, but each stage is of the same duration. Now, with each stage being the same duration then, when I run the assembly line, the team of workers that are working on stage one will then drop down to work on stage one on the next aircraft that enters into the production line.

> And the same thing for stage two . . . . And that's important obviously because it means your stage one workers are always working from aircraft one, aircraft two, aircraft three, on the same packages of work, and it also means the line moves in a smooth sequence.
>
> If you don't have these stages as equal, equal durations, then you'll get out of sync, so it's extremely important to do that. So for the learning curve theory and to drive the line, it's important that we do this drumbeat.

Tr. at 3422-23.

Absent the drumbeat to define work to be performed at each stage, knock-on effects of line disruption would ripple throughout the production sequence for every following aircraft. Thus, laborers would "work around the problems . . . . If I don't finish that in stage one, then the line still moves, but I have to catch up with the work in stage two, or stage three, or stage four. But I keep the line moving, the drumbeat must be maintained." Tr. at 3424

Because plaintiff could not institute the drumbeat without the estimates for cycle time and work content, the production line actually did not reflect a balanced drumbeat until much later in 1996.

4) The governance system – Embrico Charts

An integral part of plaintiff's Belfast manufacturing operations was its governance system, and the September 1995 Action Plan adopted it for the project. The governance system monitors progress across the shop floor and tracks worker efficiencies against the time estimates per task. To accomplish these concurrent goals of governance, plaintiff used a system of Embrico Charts, which were oversized charts stationed beside the aircraft at each stage, one chart per stage. The Embrico Charts allocated tasks on a daily basis. Mr. Ballard explained:

> The general use of these charts were that the various disciplines involved on the shop floor would meet on a regular basis, usually at the end or the beginning of each shift, to assess what had been achieved or what needed to be achieved, mark the progress [on the Embrico Chart], and determine any factors that were impacting the actual production.

Tr. at 2856. Each task on the chart had a description of the allocated hours and a WPS number.

11. Belfast post-acquisition support

Parts supply, coming out of Belfast, was an issue to be addressed with the acquisition and overhaul of WVAC's operations. The overall need for support from Belfast was identified early on as a major concern by Mr. Lyle, the new General Manager at WVAC, replacing Mr. Nesbitt. One aspect of that support was personnel. Mr. Lyle wrote a December 15, 1995 fax to Mr. Brundle, reflecting disappointment with the level of personnel support:

> On the matter of Belfast support, when I came to WVAC, it was my understanding that our overall strategy in dealing with these problems was to initially apply Belfast resources, such as Gilmore . . . , in key areas until U.S. managers could be brought in to take over. . . .
>
> The message . . . this week that Belfast's support level will be dramatically reduced now that first flight is complete (coupled with a mandated EAC [estimate at completion] and budget (staff) reductions) has had a demoralizing [e]ffect on those sent here to turn these programs around. . . . There is a sense of abandonment by some here which we have to turn around.

These concerns persisted into February 1996, as, for example, the following excerpt from a February 12, 1996 fax states:

> As the responsibility for the majority of parts supply is with Belfast you need to ensure that the correct focus and emphasis is in place. The daily communication of needs and priorities from WVAC is not being adequately addressed, consequently we are left in limbo as to the status to report to Operations, which means they are unable to make judgments on whether to proceed to other work.

By spring 1996 plaintiff had a full suite of WPS's and a finalized work-estimate. Aircraft 9 thus became, according to Mr. Nesbitt, plaintiff's "first proper production follow-on aircraft[.]" Tr. at 1205.

By July 1996, almost one year after Operations took over, plaintiff delivered the first two aircraft to ATCOM; aircraft 3 through 11 were in process. Although the project had advanced significantly, plaintiff was on the cusp of discovering yet another unexpected problem.

12. Discovery of corrosion on aircraft 12

The SD3-60 aircraft were second-hand or used aircraft that had problems attendant to their age. One problem that plaintiff knew would be encountered was corrosion, which, as explained by Mr. Cowan, "eats away at [] material, so you lose thickness and material strength, and so you can have catastrophic failure basically." Tr. at 3007. Because approximately 300 aircraft of a similar design were in service, and plaintiff performed routine maintenance on them, plaintiff had the benefit of knowing what kinds of corrosion issues faced the in-service fleet. Operators in the past confronted corrosion issues, and plaintiff – even before this project – had developed repairs for them. For example, as Mr. Cowan testified, "we knew we had some wing skin corrosion where the engine exhaust blow out, it goes out over the top and bottom of the wings, and that causes corrosion." Tr. at 3010.

While some extent of corrosion was anticipated, plaintiff discovered in August 1996 an unexpectedly high level of corrosion on the stub wing of aircraft 12. The stub wing on the SD3-60 is a structure that juts outward from the bottom of the fuselage connecting it to the wheels. It resembles a second set of wings, but much smaller than the actual wings that extend from the top of the fuselage. The stub wing supports the landing gear and the undercarriage of the aircraft. The wheels have a strut that extends upward and is connected to the wing to support it.

Sam Coey, the stress engineer who investigated the corrosion problem on the stub wing, testified that "it was a surprise that there was any corrosion at all in the first place because the centre section structural components had been designed very much with anti-corrosion methods in mind, and it had been extensively fatigue-tested on a test rig." Deposition of Sam Coey, Aug. 11, 2000, at 35. He also stated that "[n]owhere had anybody ever reported anything like that before." Id. The stub wing was not an area normally exposed to weather: "[I]f you can imagine the stub wing growing out from the side of the aircraft but then it is surrounded by fairings, and even underneath they didn't expect, you know, that any mud or whatever thrown up by the wheels would get into the stub wing." Id. at 33.

Mr. Haggerty, plaintiff's expert in aircraft manufacturing, explained that corrosion is not something that is "immediately apparent" by looking at surfaces. Tr. at 421. "[R]ust and corrosion get under those surfaces, and . . . those can cause cracks to propagate on a hard landing, and all of a sudden, the airplane crashes on landing." Id. Viewing the corrosion inside the stub wing required removal of some fifty rivets. The structure included several significant structural bolts.

An October 15, 1996 memorandum documents the findings of the inspection of aircraft 12. The aircraft was inspected, damage on the port undercarriage "rib flanges" was "blended out," and box fitting was replaced. Mr. Cowan defined the term "blended out":

> [Blended out] means we've scraped away to find how deep the corrosion goes, and then very important, on an aircraft, you can't have nicks and scratches in very significant structure because it encourages cracks, so you've got to polish and blend this out until you remove the corrosion. . . .
>
> But there is a box fitting, which is a machine fitting that sits between the other major elements of the stub wing, it was so bad, it had to be replaced.

Tr. at 3008. According to Mr. Haggerty, this type of an inspection could reveal that bolts may have had to come off, "and then a piece of structure would have to come off, and then you have to put new bolts in those things, and these holes would have to be reamed out to be able to get tight tolerance, the tight fit of the bolts that will hold that structure on." Tr. at 425.

Defendant contended, but did not prove, that aircraft 12 corrosion was the situs of the worst. Although plaintiff did not quantify the extent of corrosion, once found, plaintiff took reasonable measures to deal with its potential occurrence on every aircraft.

In a letter dated September 19, 1996, Mr. Cowan directed Shorts Inc., which was doing some purchasing of donor aircraft, to make "additional inspections . . . on any current or future pre-purchase inspections." Mr. Cowan also listed several detailed inspection procedures and explained that "[t]hese inspections are essential in order to reduce the significant cost and schedule impact associated with this corrosion damage." Stress engineer Coey testified that aircraft used in a marine environment had more corrosion than those used in the Continental U.S. Coey Dep. at 33.

With that discovery, plaintiff had to re-inspect, to a great extent, areas of the aircraft in process that initially had not been inspected to that level. A memorandum from an October 14, 1996 meeting reports the results of the "damage assessment and rework on [aircraft] 1 through [aircraft] 17[.]" It states the need for service bulletins to go out to the fleet to make additional inspections. According to Mr. Cowan, approximately eight aircraft were identified as having "serious corrosion that required stripdown and significant pieces

of disassembly." Tr. at 3006. One particularly heavily corroded stub wing was found on aircraft 16. 51/

A procedure put in place for subsequent pre-purchase inspections (those occurring after September 1996) made use of a flexible boroscope, which was a device with a camera that can be placed into areas to see beyond which is externally visible without requiring more severe tear down, *e.g.*, removal of fairings. A letter dated December 3, 1996, from Mr. Cowan to Shorts Inc. reported that "[e]ngineering will accept inspection information based on the instructions laid down in [an attached a November 6 fax] provided all [pre-purchase inspections] carried out from this date comply." The attached November 6 fax stated:

> We have evaluated the feasibility of adequately inspecting the stub wing structure during the Pre-Purchase Inspection [], by using aircraft 15 in your production line as a sample. . . . We found that we could inspect at least 90 percent of the area (that could be seen after removal of the forward pintle pins) with the use of a flexible boroscope and the use of a guide tube.

51/ Mr. Coey testified that only one out of the twelve aircraft he worked on had serious corrosion. Defendant gleaned from Mr. Nesbitt a concession that Mr. Coey had more expertise in corrosion area than he did. According to Mr. Coey:

> Q. Okay. So the results of your survey then and your examination of each aircraft, at least those that had arrived at WVAC [which he testified was about a dozen], did you determine that needed repairs were going to be very costly, or do you recall?
>
> A. Well, not that I recall. There was one aircraft where we had to replace the strut pick-up bracket. This is the strut that comes down from the wing. It picks up on a large block with a lug on it and the phalanges of it were badly corroded and we had to replace that. But on all other aircraft that I remember the corrosion was a lot less. It was only slight, mainly surface corrosion, which we were able to clean away and didn't have to reinforce. The stress levels in that area being very low, plus the database that we had on the fatigue test, we were happy enough to clean that corrosion up and let it go at that.

Coey Dep. at 34. The court's review of this transcript causes it to discount plaintiff's contention that deep corrosion was unknowable and pervasive. However, Mr. Cowan established that plaintiff did undertake to reinspect all aircraft.

The proposed inspection plans appear on an attached "Proposed Pre-Purchase Inspection Appendix Stub Wing Structure Inspection[,]" which included instructions such as "[r]emove the following access panels," "[t]horoughly steam clean the entire stub wing structure," "[r]emove the small inspection panel," and conduct a visual inspection using a boroscope and guide tube. Coupled with Mr. Cowan's testimony that the procedure was adopted and the lack of probative evidence as to the extent of deep corrosion, the court cannot find that plaintiff lacked any means other than complete disassembly for identifying the probable extent of corrosion damage. Nonetheless, the consequences were severe.

The discovery of corrosion damage precipitated several knock-on effects: More parts came off the aircraft, new parts were manufactured, and additional time was expended on stripping and painting the surfaces – all of which caused delay to the schedule. It also meant more planning, including detailed assessment of, for example, material thickness, by stress engineers. The timing of the discovery created out-of-sequence work. For example, the discovery of the stub wing corrosion, according to Mr. Cowan, occurred while some aircraft were in the jig. The jig must be disassembled with the aircraft in it to allow for inspection, and the jig then must be reassembled. Mr. Cowan also explained that corrosion "has a cascade effect on every single item. It's like all the nonroutines. Every time you order a part out of, out of the blue or out of sequence, it has that same cascade of delays." Tr. at 3015.

The extent of the corrosion also created some confusion with how the repairs would be charged under the contract. A December 5, 1996 letter from ATCOM to Ms. Crone (Gilmore by the date of trial), plaintiff's Contract Manager for the C-23B+, states that "[t]his letter is for clarification on corrosion repair to be charged under the contract over and above line." It continues:

> When this proposal was written and negotiated as a contract with Shorts, it was believed that the SD3-60 aircraft that would be programmed into the production line would have superficial corrosion (light surface corrosion) only. Heavy extensive penetrating corrosion was not believed to be on the SD3-60 aircraft that would be purchased.
>
> . . . [I]f aircraft corrosion is superficial, easily neutralized, primed and painted, it is considered under the firm fixed price of the contract. If the corrosion is extensive, deep, and penetrating, requiring removal of paneling or decking to get to the area for corrosion treatment, all this work, including corrosion neutralization or repair, will be authorized for payment under the "over and above" contract line.

Like corrosion on the stub wing, any area with deep corrosion could cause knock-on effects.

Mr. Brundle also explained that parts procurement for corroded areas was a problem:

> [Y]ou had corrosion of the . . . floor rails . . . you have to then actually go back into engineering. . . . You have to decide whether you're going to replace, you've got to actually manufacture the parts. Please remember, this was an out of production airplane. Those items are nonspareable items in normal environment. They have to be sourced. They have to be maintained. To replace a seat track, for example, or a floor beam, could have taken weeks to actually do.

Tr. at 3992.

13. Other unexpected problems: role beam, RTOP

The frames, the roof, and corrosion were not the only unexpected problems that occurred during the life of the program. Other significant problems arose with the role beam and the functioning of the engines.

1) Role beams

The contract required plaintiff to install a new role beam into the C-23B+, a part not in the SD3-60s, but a feature of the C-23B. The role beam is a structure fitted inside the aircraft to which a paratrooper anchors his equipment prior to jump off. Mr. Nesbitt explained:

> [T]he [role] beam was actually fitted to the C-23 series aircraft, so we thought all we needed to do was lift it and put it into the [converted SD3-60], but when we went to fit the parts, the thing just wouldn't fit. It wouldn't fit for two reasons.
>
> Number one, the operators, the airlines had maybe done some work in that area. Number two, the, we'd done some work to fix other issues, you know, trying to get the frames issue, the roof issue, et cetera, so we just weren't able to fit the parts. . . . Again, that created new parts. It stopped work and everything else.

Tr. at 1134-35. Mr. Nesbitt further explained that these problems did not occur in a "new build, [where] basically everything all lines up." Tr. at 1137. In the C-23B+ program, plaintiff "found a lot of the holes didn't pick up" because "the structures had been out and flying about and movement and years in service, et cetera[.]" Tr. at 1137. As a consequence,

plaintiff "ended up having to get new parts to modify [the role beams] on the bench before [plaintiff could] actually take them to fit them on the aircraft." Tr. at 1138. This resulted in more parts additions to the BOM.

2) RTOP

Another problem during testing of the C-23B+. It involved a system called the Reserve Takeoff Power System ("RTOP"). RTOP, as explained by Mr. Cowan, is a critical system designed to automatically increase power to one engine if the other one fails during takeoff. When plaintiff tested the RTOP system, after having overhauled the engines on the aircraft, it failed the performance tests by not delivering the required power increase.

Like corrosion, RTOP functioning became an issue for the entire fleet of SD3-series aircraft, requiring the issuance of service bulletins. Also, like corrosion, and, indeed, every other problem, RTOP failure precipitated more knock-on effects. Mr. Cowan recounted this challenge:

> And so that meant back on the ground again, that's that flight test, or that piece of flight test back on the ground, start to adjust fuel control units, power control cables, power levers, look at the RTOP sensing system, torque pressure switches that make all that work, and then go and do another flight test. And in some cases, we ended up replacing engines to get the engine to do what it was meant to do.

Tr. at 3019.

In the end, he conceded on cross-examination that the cause of the RTOP problem was "[l]ess efficient overhauled engines." Tr. at 3148. The solution involved a "combination of things":

> We got Pratt & Whitney [the subcontractor for the engines] to carry out better testing in their overhaul facility. We negotiated with the CAA, and by 1998 and 1999, we had revised the test criteria, such that the test would still approve if the RTOP system was suitable and working, but didn't require the same level of boost as required from a new engine.

Tr. at 3149.

14. Final years of performance; recap of work

Although no witness could recall the date, at some point after the WVAC takeover, with the knowledge gained from the controlled tear down of aircraft 9, the discovery of the

various problems including the roof, the frames, corrosion, and the role beam, plaintiff decided that all systems and subsystems should be removed, effectively gutting the aircraft and starting anew. In any event, plaintiff's production line at WVAC was up and running during 1996, and, although the planning revisions did occur thereafter, mid-1996, following completion of the controlled tear down of aircraft 9, marks the beginning of work on aircraft 10 and a much more efficient operation.

Work on aircraft 10 commenced in April 1996. Plaintiff had not completed or delivered any earlier aircraft by then; however, implementing the new production line on aircraft 9 and 10 resulted in a drastic reduction in time for subsequent aircraft: aircraft 1 took 29 months to complete, and aircraft 9 took 17.5 months. In contrast, the contract delivery schedule allowed 18 months to complete the first article and then 9.5 months to complete aircraft 9. After plaintiff instituted the production line, aircraft 10 through 28 took 10 to 13 months to complete. The original contract scheduled 9 months each for those aircraft. Plaintiff delivered aircraft 28 in September 1998.

Defendant did not dispute the number of hours and costs that plaintiff incurred to deliver twenty-eight completed C-23B+ aircraft. McCoy's presentation of plaintiff's claim shows, at a minimum, a rough order of magnitude that plaintiff characterizes as additional work:

1. 253,531 labor hours at WVAC under the contract, including painting, inspection, and flight test, versus 945,521 claimed reasonable hours. 52/

2. 83 laborers working on the contract at peak versus claimed actual peak number of 319 laborers.

DISCUSSION 53/

52/ Plaintiff built its claim from the ground up to generate what Mr. McCoy proffers as the minimum standard reasonable hours – 728,000, its "best-case scenario," Tr. at 1717, for performing this work. Given the difficult circumstances that plaintiff encountered, plaintiff calculated 945,000 hours as reasonable. In view of its disposition on liability, the court makes no findings with respect to plaintiff's methodology for computing damages, including the hours claimed, hourly rate, and application of the learning curve.

53/ This case bears striking similarity to Northrop Grumman Corp. v. United States, 47 Fed. Cl. 20 (2000). Northrop Grumman involved a sophisticated contractor's underbidding on a firm fixed-price contract to create software for computer systems used in new portable military command centers for the United States Marine Corps. Despite full

Two factors distinguished this trial. Seven percipient witnesses testified by deposition, and defendant tried its case almost entirely on cross-examination. 54/ Regarding the latter, the testimony of plaintiff's witnesses did not go unrebutted. In fact, defendant was able to diminish the testimony of every witness to a greater or lesser extent. The court's findings reflect the impact of defendant's success. In addition to the findings recited above, the court makes additional findings in applying the law to the facts of this case.

Plaintiff pleaded the following nine counts in its complaint filed on November 25, 1998: (1) improper use of firm fixed-price contract under the DoD Appropriations Act, 1991 and the DoD Appropriations Act, 1992; (2) improper use of firm fixed-price contract under the Federal Acquisition Regulation; (3) impossibility of performance; (4) commercial impracticability; (5) failure to disclose superior knowledge; (6) mutual mistake; (7) defective government furnished property; (8) breach of implied duties of good faith, cooperation, and fairness; and (9) unjust enrichment.

By order dated March 18, 2004, this court granted, in part, defendant's motion for summary judgment and entered judgment against plaintiff on several counts. Short Brothers, PLC v. United States, No. 98-894C (Fed. Cl. Mar. 18, 2004) (unpubl.) (the "Summary Judgment Order"). The Summary Judgment Order granted defendant's motion on the

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53/ (Cont'd from page 107.)

access to a library of material from the Government and in purported reliance on governmental approval, plaintiff failed, in its proposal, to appreciate the true developmental nature of the project and, consequently, overspent by millions. Plaintiff attempted to recover its excess expenditures based on theories of illegal contract, breach of contract, superior knowledge, impossibility, and mutual mistake. Plaintiff received a partial award.

The complicated scenario of contract formation and performance parallels the relationship between plaintiff and ATCOM, and the legal analysis follows suit. To the extent that legal analysis in Northrop Grumman is not discussed specifically, it is incorporated by reference.

54/ The court used deposition testimony when key on a given point. The parties cross-designated the deposition transcripts, and the court read the entire transcript of each deponent for context. These depositions date to 2000.

In addition, plaintiff asked the court to consider all of the filings on summary judgment. The court evaluated all the documentary evidence submitted at trial; however, the court did take into account the briefs filed on summary judgment.

following counts: Counts 1 and 2 for improper use of a firm fixed-price contract; Count 3 - impossibility of performance; Count 7 - defective government furnished property; and Count 9 - unjust enrichment. The following counts survived summary judgment: Count 4 - commercial impracticability; Count 5 - superior knowledge; Count 6 - mutual mistake; and Count 8 - breach of implied duties of good faith, cooperation, and fairness.

The Summary Judgment Order advised that the trial opinion would address more fully the reasons for decision. The following discussion, accordingly, explicates the grounds for decision by count, both for those counts adjudicated on summary judgment and those counts that proceeded to trial.

I. UNLAWFUL USE OF A FIRM FIXED-PRICE CONTRACT (COUNTS 1 & 2)

In Counts 1 and 2 of the complaint, plaintiff sought recovery on a theory that the Government's alleged violation of both statutory and regulatory requirements in choice of contract entitled plaintiff to relief. Defendant moved for summary judgment, arguing that, even if the provisions were applicable and were violated, plaintiff's claims fail as a matter of law because these provisions are not enforceable by a contractor. Briefing on defendant's summary judgment motion preceded the United States Court of Appeals for the Federal Circuit's ruling in American Telephone and Telegraph Co. v. United States, 307 F.3d 1374 (Fed. Cir. 2002) ("AT&T"). Supplemental briefing, initiated by defendant, followed.

Plaintiff conceded in its supplemental briefing that, "[a]lthough we argued to the contrary in our [opposition brief], we understand that . . . AT&T held that the operative statute and regulations do not create remediable rights in and of themselves." Pl.'s Br. filed Oct. 29, 2002, at 3. Plaintiff maintained its right to recovery, even in AT&T's wake, by arguing that it sought not to enforce these provisions *per se*, but, rather, to enforce the Government's implied duties of fairness, good faith, and cooperation in contract formation – duties that plaintiff contends were breached by the Government's alleged violations of statute and regulation.

1. The impact of *American Telephone & Telegraph Co. v. United States* on plaintiff's claims

Insofar as Counts 1 and 2 maintain a theory of recovery grounded not on implied duties, but on statutory and regulatory violations, AT&T controls. Count 1 complained of violations of a provision found in both the 1991 and 1992 DoD Appropriations Acts, which imposed certain requirements on the DoD before it could obligate or expend funds for firm fixed-price "development" contracts exceeding $10 million. See DoD Appropriations Act, 1992 § 8037, Pub. L. No. 102-172, 105 Stat. 1150, 1179-80; DoD Appropriations Act, 1991

§ 8038, Pub. L. No. 101-511, 104 Stat. 1856, 1882-83. This statute required the Under Secretary of Defense for acquisition to make a written determination "that program risk has been reduced to the extent that realistic pricing can occur, and that the contract type permits an equitable and sensible allocation of program risk between the contracting parties[.]" DoD Appropriations Act, 1992 § 8037, 105 Stat. at 1179; DoD Appropriations Act, 1991 § 8038, 104 Stat. at 1883. In addition, the statute required the Secretary of Defense, at least thirty days prior to the Under Secretary's determination, to "notify the Committees on Appropriations of the Senate and House of Representatives in writing of his intention to authorize such a fixed price-type developmental contract and [to] include in the notice an explanation of the reasons for the determination." DoD Appropriations Act, 1992 § 8037, 105 Stat. at 1179; DoD Appropriations Act, 1991 § 8038, 104 Stat. at 1882.

Plaintiff maintained that the C-23B+ contract was a "development contract" inasmuch as the parties understood that the project would involve development costs. Because a C-23B+ aircraft had never been designed or produced, such costs (referred to as nonrecurring costs and including first article production costs) were included in plaintiff's proposals. Defendant admitted that, in awarding the C-23B+ contract to plaintiff, the Under Secretary of Defense for Acquisition did not make the written determination specified in these statutes, nor did the Secretary of Defense notify Congress of his intent to authorize the use of a firm fixed-price contract with explanation. Def.'s Answer filed Jan. 25, 1999, ¶ 53.

Because the Federal Circuit in AT&T expressly precluded contractors from enforcing this provision as a means of obtaining a right of action for reformation, the court need not decide whether the present contract was a developmental contract. In AT&T the Federal Circuit construed section 8118 of the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriation Act, 1988, Pub. L. No. 100-202, 101 Stat. 1329, 1329-84 (1987), the predecessor to the provision of the DoD Appropriations Acts for 1991 and 1992, at issue in the case at bar, as "an appropriations oversight provision that envisions enforcement, if any, in the form of legislative spending adjustments in future bills. Section 8118 does not make any provision for judicial enforcement." AT&T, 307 F.3d at 1378. The Federal Circuit also reviewed the congressional response to the DoD's "flawed administration" of the provision after its enactment, concluding that it confirmed the court's interpretation of the statutory language. Id. In considering enactment of stricter reporting provisions (requirement of before-award reports rather than after-the-fact quarterly reports), "the Senate Armed Services Committee stated expressly that noncompliance with section 8118 should not be 'the basis for litigating the propriety of an otherwise valid contract[.]'" Id. (citing S.Rep. No. 100-326, 100th Cong., 2d Sess., at 105 (1988)). Therefore, the court determined that "the language of section 8118 provides for legislative oversight and enforcement. The section does not create a cause of action inviting private parties to enforce the provision in courts." Id. at 1379. AT&T had no cognizable claim for contract

reformation because "[s]ection 8118 simply does not provide implicitly or explicitly for any enforcement of its supervisory and congressional oversight provisions in a judicial forum." Id.

The decision in AT&T forecloses enforcement of the statutory provisions in Count 1 and from seeking relief on a similar theory in Count 2. Count 2 of the complaint pleaded alleged violations of several regulatory provisions, alleging that the use of a firm fixed-price contract is precluded under Federal Acquisition Regulation, 48 C.F.R. ("FAR") Part 16 (1993), and that FAR Part 1 does not authorize a deviation. Compl. ¶ 180. Plaintiff specifically cites to FAR §§ 1.401, 15.802, 15.803(d), 16.103, 16.104, and 16.202-2 (1993), in support of its argument. Compl. ¶¶ 181-188.

The Federal Circuit was confronted with a similar argument in AT&T. AT&T claimed that "the Navy violated a variety of procurement regulations and directives that guide a contracting officer's selection of contract type." AT&T, 307 F.3d at 1379. The court concluded that the regulations relied on by AT&T (FAR §§ 16.104, 35.006, 216.101, 216.104 (1987)) grant the contracting officer discretion in selection of contract type. Id. (citing also FAR § 16.103(a); 10 U.S.C. § 2306(a) (1982)). Even if the contracting officer had abused his discretion by negotiating the contract on a fixed-price basis, "[t]hese cautionary and informative regulations and directives provide only internal governmental direction. Like section 8118, these provisions supply no remedy for private parties in a judicial forum." AT&T, 307 F.3d at 1380.

The FAR provisions cited by plaintiff purport to do no more than to provide internal government direction. For example, FAR § 15.802 (1993), entitled "Policy," only requires that the contracting officer "[p]urchase supplies and services from responsible sources at fair and reasonable prices[.]" FAR § 15.802(b)(1). It does not afford a judicial remedy. Section 15.803(d) provides guidance for the contracting officer's selection of contract type:

> The contracting officer's objective is to negotiate a contract of a type and with a price providing the contractor the greatest incentive for efficient and economical performance. . . . [T]he contracting officer should not become preoccupied with any single element and should balance the contract type, cost, and profit or fee negotiated to achieve a total result and price fair and reasonable to both the Government and the contractor.

FAR § 15.803(d). As the Federal Circuit concluded in AT&T regarding FAR §§ 35.006(c) and 216.104, this court rules that section 15.803(d) is cautionary and provides guidance to the contracting officer on selection of contract type. However, the provision is not

prohibitive. See AT&T, 307 F.3d at 1379-80. It does not supply a judicial remedy, but only provides internal government direction.

The Federal Circuit also construed sections 16.103(a) and 16.104 as regulations that "grant the contracting officer the discretion to select the type of contract." Id. at 1379. Similarly, FAR § 16.202-2 addresses the situations in which a firm fixed-price contract is suitable; it does not place restrictions on the contracting officer or his selection of contract type: "A firm fixed-price contract is suitable for acquiring commercial items . . . or for acquiring other supplies or services on the basis of reasonably definite functional or detailed specifications . . . when the contracting officer can establish fair and reasonable prices at the outset[.]" FAR § 16.202-2. This grant of discretion is incompatible with an outright prohibition on selection of contract type. Therefore, summary judgment entered against plaintiff on its Counts 1 and 2 claims because plaintiff cannot predicate an action for improper use of a firm fixed-price contract on a statute or regulations that do not provide a judicial remedy.

2. Implied duties during contract formation

Plaintiff sought to avoid AT&T's otherwise conclusive bar on plaintiff's first two counts by characterizing the complaint as seeking relief on a theory not expressly adjudicated in AT&T: violation of implied duties during contract formation. By violating these statutory and regulatory provisions that pertain to contract type and formation, plaintiff contends that the Government effectuated a violation of its duties to exercise good faith, fair dealing, and cooperation during contract formation: "[W]e do not believe that [AT&T] precludes us from asserting that the statute and FFP [firm fixed-price] regulations set the 'baseline' for fair and reasonably cooperative conduct in FFP contract formation." Pl.'s Br. filed Oct. 29, 2002 at 4 (footnote omitted, which stated that "[n]or do we believe that [AT&T] would prevent the Court from finding that breach of an implied duty had occurred and was remediable as for a constructive change to the contract"). In so doing, plaintiff circumvents AT&T and refocuses the inquiry from enforceability of provisions to the nature of implied duties during formation. 55/

55/ Unlike the typical claims for breach of implied duties of good faith, fair dealing, and cooperation, which complain about conduct during performance, Counts 1 and 2 address the Government's actions prior to performance. Plaintiff does assert the more typical claim in Count 8. Counts 1 and 2 are somewhat novel in the sense that they charge that the Government's conduct prior to award in creating the RFP and in awarding the contract breached the contract by violating the Government's implied duties.

Plaintiff invokes a line of cases beginning with Heyer Products Co. v. United States, 140 F. Supp. 409 (Ct. Cl. 1956), which plaintiff trumpets as showing "the existence of implied duties of good faith, fairness and cooperation in contract formation, and the ability of the Court to provide a remedy where such implied duties are breached." Pl.'s Br. filed Oct. 29, 2002, at 3. Plaintiff misreads Heyer Products.

Heyer Products does not involve implied duties that must be discharged during contract formation. Rather, it is one of the earliest cases from the United States Court of Claims that acknowledges the redressability of implied-in-fact contracts between a procuring agency and an unsuccessful bidder. See generally CACI, Inc.-Federal v. United States, 719 F.2d 1567, 1572-74 (Fed. Cir. 1983) (discussing history of unsuccessful bidders' standing to challenge award and cases including the seminal case of Scanwell Laboratories, Inc. v. Shaffer, 424 F.2d 859 (D.C. Cir. 1970); Keco Industries, Inc. v. United States, 428 F.2d 1233 (Ct. Cl. 1970), appeal after remand, 492 F.2d 1200 (Ct. Cl. 1974); and Heyer Products, 140 F. Supp. 409). In Heyer Products a disappointed bidder sued the contracting agency for awarding the contract to another bidder solely in retaliation against plaintiff for testifying against the contracting agency before a Senate hearing. Heyer Products, 140 F. Supp. at 410-12. Defendant moved to dismiss the complaint, arguing that the established case law precluded unsuccessful bidders from having standing to enforce statutes governing the awarding of bids. Id.

According to the Court of Claims, plaintiff's allegations, if true, made a case of discrimination against it and a "sham" and "fraud" committed against bidders. Id. at 413. While acknowledging the inability of unsuccessful bidders to enforce the statutory bid consideration provisions, the Court of Claims held that plaintiff could not recover lost profits, but the cost of its bid preparation expenses was recoverable on an implied-in-fact contract theory: "It was an implied condition of the request for offers that each of them would be honestly considered. . . . This implied contract has been broken, and plaintiff may maintain an action for damages for its breach." Id. at 412-13.

Heyer Products is inapposite to this case because it does not do what plaintiff says it does: bind the Government to implied duties during the formation of a contract. The rule that Heyer Products established is enforcement of a distinct implied-in-fact contract between a contracting agency and bidders.

Although plaintiff also relies on Keco Industries, 428 F.2d 1233, this case, too, enforces an implied-in-fact contract between a contracting agency and bidders. The salient difference between Heyer Products and Keco Industries is that the plaintiff in Keco Industries was not the low bidder alleging bad faith and discrimination; rather, plaintiff was a bidder alleging that the contracting agency violated governing statutes by awarding the

contract to a bidder whose proposal the Government knew or should have known could not succeed. See Keco Indus., 428 F.2d at 1236. The Court of Claims refused to limit Heyer Products to bad faith allegations, explaining that "Heyer stated a broad general rule which is that every bidder has the right to have his bid honestly considered by the Government[.]" Id. at 1237. In sum, Heyer Products and Keco Industries, cases that have everything to do with implied contracts, have nothing to do with implied duties during a contract formation.

Plaintiff invokes another line of cases, also inapposite, that deals with the Government's duties in preparing estimates for requirements contracts. Hi-Shear Tech. Corp. v. United States, 53 Fed. Cl. 420 (2002), appeal as to damages only affirmed, 356 F.3d 1372 (Fed. Cir. 2004), held the Government liable for negligently preparing estimates for use in two requirements contracts. This decision applied controlling precedent that allows contractors to maintain actions against the Government for negligently or in bad faith preparing estimates. See Medart Inc. v. Austin, 967 F.2d 579 (Fed. Cir. 1992); Clearwater Forest Indus. v. United States, 650 F.2d 233 (Ct. Cl. 1981). The Federal Circuit's most recent explication of the Government's obligations – and the effect of their breach – is Rumsfeld v. Applied Companies, Inc., 325 F.3d 1328 (Fed. Cir. 2003), a case decided after the parties had briefed the summary judgment motion in this case. It applies the same line of cases as did Hi-Shear.

Applied Companies involved the procurement by the Defense Logistics Agency (the "DLA") of storage cylinders for a certain substance. The DLA issued an RFP that contained an estimate for the number of cylinders anticipated, as the contract would require the DLA to obtain all cylinders from the contractor for a given period. Although the DLA determined prior to award that the estimate was overstated and erroneous, it failed to inform the contractor of that until after award. It ordered only one tenth of the amount it represented in the estimate. Id. at 1331-32.

The Federal Circuit upheld a board of contract appeals determination that the DLA breached the requirements contract by including a negligently prepared estimate in the RFP:

> These estimates, though "not guarantees or warranties of quantity," constitute one of the only limitations on the government's otherwise almost unbridled flexibility with respect to the number of units it purchases. Therefore, there is an implied obligation upon the government to "act in good faith and use reasonable care in computing its estimated needs." Failure to meet that obligation constitutes a breach of the resulting contract.

Id. at 1335 (quoting Shader Contractors, Inc. v. United States, 276 F.2d 1, 7 (1960), and Medart, 967 F.2d at 581)). The earlier case of Medart, cited by Hi-Shear, stated: "Where

a contractor can show by preponderant evidence that estimates were 'inadequately or negligently prepared, not in good faith, or grossly or unreasonably inadequate at the time the estimate was made[,]' the government could be liable for appropriate damages resulting." Id. (quoting Clearwater Forest Indus., 650 F.2d at 240).

Under Applied Companies a contract gives rise to an implied obligation to exercise good faith and to use reasonable care owed to the contractor when the Government prepares an estimate for a requirements contract. Here, however, plaintiff seeks to expand that rule of law to impose on the Government implicit duties of fairness and cooperation with regard to the choice of contract – duties that can be violated when the statutory provisions pertaining to contract choice are violated. Plaintiff offers no authority or reasoning for such an expansion, and this court can find none.

Applied Companies, Hi-Shear, and related cases address the unique circumstances of government-prepared estimates used for requirements contracts. The tenuous analogy between a bidder's reliance on an estimate for a requirements solicitation, see Medart, 967 F.2d at 581, and a bidder's reliance on the Government's choice of contract (an analogy that plaintiff does not address), without more, does not warrant such an extension. Furthermore, AT&T's description of the statutory provision as "an appropriations oversight provision . . . [that] does not make any provision for judicial enforcement" and the regulatory provisions as "cautionary and informative regulations and directives" that "supply no remedy for private parties," AT&T, 307 F.3d at 1379-80, stand in stark contrast with the Applied Companies description of the provisions governing estimates preparation as "one of the only limitations on the government's otherwise almost unbridled flexibility with respect to the number of units it purchases[,]" Applied Cos., 325 F.3d at 1335. Allowing a contractor to recover for the Government's violations of the provisions governing contract type choice via implied obligations would render meaningless AT&T's preclusion on enforceability by a contractor.

In its final effort to avoid application of AT&T, plaintiff attempts to distinguish the case on the facts. According to plaintiff, the following are "material factual differences" that "highlight the gross inequity that would be allowed if [plaintiff was] not able to pursue its case": (1) plaintiff "was neither a large nor a greatly experienced Government contractor at the time of award[,]" (2) plaintiff did not "undertake a vigorous competition in order to obtain the award[,]" and (3) plaintiff did not "defend a protest in order to maintain its award." Pl.'s Br. filed Oct. 29, 2002, at 5.

Plaintiff's argument is flawed in that AT&T decided purely a question of law on statutory and regulatory interpretation: "Section 8118 simply does not provide implicitly or explicitly for any enforcement of its supervisory and congressional oversight provisions in

a judicial forum." AT&T, 307 F.3d at 1379. The Federal Circuit, however, did express an alternative ground for its ruling, stating "[i]n view of the facts of this case, this court would be forced to conclude that AT & T waived its present arguments even were those arguments to state a valid claim." Id. at 1380. Plaintiff presumably grounds its argument on this language in AT&T because the Federal Circuit's discussion on waiver noted that AT&T was a "sophisticated player . . . [that] bargained for and won a fixed-price contract" but failed to seek an alternative contract type during contract negotiations. AT&T also "successfully underbid technically superior competitors" and "retained the contract with a vigorous defense against a competitor's protest action." Despite these facts, the Federal Circuit stated, "AT & T now argues that the courts must relieve it of the risk that it so aggressively pursued. It is too late now to make that claim." Id.

Even if plaintiff's interpretation served to distinguish its case, the Federal Circuit removed any doubt as to the precedential effect of its statutory interpretation rationale by memorializing, in the final section of AT&T, the following: "CONCLUSION[:] In sum, AT & T does not have an enforceable interest in section 8118 or the asserted procurement regulations and directives. This court, therefore, affirms." Id. at 1381. Because the applicable provisions in the United States Code and the FAR are not enforceable by a private contractor to an otherwise valid contract, the referenced "material factual differences" may be differences, but they are not material.

II. IMPOSSIBILITY OF PERFORMANCE, COMMERCIAL IMPRACTICABILITY, AND FAILURE TO DISCLOSE SUPERIOR KNOWLEDGE (COUNTS 3 - 5)

1. Legal standards

Plaintiff seeks an equitable adjustment in the contract in Counts 3 through 5 on theories of impossibility of performance, commercial impracticability, and failure to disclose superior knowledge. To prove plaintiff's claim for impossibility of performance and commercial impracticability – theories that have merged over time, see Seaboard Lumber Co. v. United States, 308 F.3d 1283, 1294 (Fed. Cir. 2002) ("[T]he doctrine of impossibility does not require a showing of actual or literal impossibility of performance but only a showing of commercial impracticability.") – plaintiff must establish that its "performance under [the contract] is impracticable without his fault because of a fact of which he has no reason to know and the non-existence of which is a basic assumption on which the contract is made[,]" Restatement (Second) of Contracts § 266(1) (1981) (hereafter "Restatement"); see Seaboard Lumber Co., 308 F.3d at 1294-95 (applying formulation of doctrines as stated by United

States Supreme Court in United States v. Winstar Corp., 518 U.S. 839, 904 (1996), and Restatement § 261 to affirm rejection of contractor's impossibility and impracticability claims).

Plaintiff's burden with respect to its claim for failure to disclose superior knowledge requires it to prove:

> (1) [The contractor] undertook to perform without vital knowledge of a fact that affects performance costs or direction, (2) the government was aware the contractor had no knowledge of and had no reason to obtain such information, (3) any contract specification supplied misled the contractor, or did not put it on notice to inquire, and (4) the government failed to provide the relevant information.

AT&T Comms., Inc. v. Perry, 296 F.3d 1307, 1312 (Fed. Cir. 2002). The court will set forth more fully these theories of relief after summarizing the parties' arguments.

2. Plaintiff's arguments

Plaintiff contends that the SOW and WBS were defective inasmuch as they grossly underappreciated or underestimated the work to be performed and understated or underestimated the technical content of the work required. Specifically, the SOW precluded the use of a prototype and did not include language that all systems and subsystems needed to be removed, and provided for a tear down inspection – which was intended to discover the O&As – that was inadequate for its purpose. Plaintiff views these SOW deficiencies as the consequence of assumptions that the C-23B+ conversion task could be accomplished in a manner similar to any straightforward modification task. Plaintiff therefore proposed an effort that was responsive, although ultimately deficient, utilizing a straightforward, and less costly, modification-style production means to accomplish what it believed to be a straightforward modification project.

The defective SOW caused the increase in unforeseen and unforeseeable technical content, combined with the vast expansion of O&A work, and insufficient plant facilities and space – all of which rendered impossible completion of contract performance within time and production schedules. The difficulties that plagued plaintiff's performance at WVAC were unavoidable consequences of implementing the misconceived plan of a

modification/refurbishment effort as endorsed by ATCOM. Plaintiff always was one step behind, formulating its decisions in reaction to the discoveries made during what Mr. Nesbitt called the "voyage of discovery." Tr. at 1108. Plaintiff sought to prove that the production means actually required and used – after a complete and controlled tear down to define work content; the use of what became an informative, valid first production run; the removal of all or almost all systems and subsystems; altered learning curve assumptions and labor requirements (both in number and function) – constitute the procedures employed in what the aerospace industry refers to as "remanufacturing" projects.

The difficulties that plaintiff encountered during performance of the C-23B+ contract, plaintiff urges, support a finding that the contract required extreme and unreasonable difficulty, expense, and loss. Maintaining that the growth in contract time and money would have been unavoidable for any contractor under the circumstances, and that it was unaware of vital information that would have revealed the true requirements of the project, plaintiff predicates liability theories based on impossibility and commercial impracticability.

Plaintiff also charges the Government with awareness of the realities of what lay in store for plaintiff prior to award. ATCOM knew that the C-23B+ contract called for a remanufacturing effort and was in possession of vital information that would have alerted plaintiff to the inadequacies of its proposal. Instead, the Government committed "unpardonable failure" by withholding this information and putting its seal of approval on a proposal that it knew reflected "gargantuan differences" between anticipated and actual costs. See Pl.'s Br. filed Dec. 30, 2004, at 35.

Acknowledging the situation at WVAC during the first few years of performance, plaintiff discounts the actual costs that it attributes to WVAC's activities pre-takeover and, instead, puts forth a standard-hour estimate: the minimum time and cost of the C-23B+ contract that any reasonable contractor would expend in the most perfect of situations. Based on those estimates, the "gargantuan difference[s]" between the contract assumptions and the actual minimum requisites 56/ would have included an increase of almost 700,000 hours for work, with a corresponding increase of associated direct costs of over $28 million; increase in materials cost of $5.6 million; increase in design engineering costs of over $1 million;

56/ Plaintiff did not seek recovery for its actual performance costs. Instead, it presented a damages theory based on what a reasonable contractor, under best-case conditions, could have accomplished, with an additur for hours attributable to the difficult circumstances confronted on this contract.

increase in first article support costs of $459,000; over $771,000 increase for methods engineering; increase in O&A costs of over $16.5 million; increase in time for completion of all twenty-eight aircraft from thirty-five months to forty-three months (delivery of the 28th aircraft in April 1997 instead of October 1996); and other increases, for a total price deficiency of $59 million. Plaintiff's actual losses substantially exceeded this amount.

3. Defendant's arguments

Defendant did not dispute the amount of cost overruns that plaintiff incurred, 57/ but directed much of its defense to plaintiff's admitted responsibility for WVAC's initial failures of performance, and elicited testimony, and offered other evidence, to contend that plaintiff's fault in performance failures was so substantial that it wholly undermines plaintiff's case. Impossibility or commercial impracticability did not cause plaintiff's cost overruns; rather, defendant asserts that the overruns were the consequence of plaintiff's poor business judgment, repeated failures to heed its own advice, and substandard performance on the shop floor.

Even were plaintiff to prove that performance per the negotiated contract was impossible or impracticable, defendant maintains that plaintiff cannot recover for any impossibility or impracticability because plaintiff assumed the risk of the cost overruns that were incurred. Plaintiff, defendant reminds the court, is a sophisticated contractor that proposed a means by which to accomplish a performance specification, and it agreed to deliver the C-23B+ aircraft at a fixed price.

Defendant also attacks plaintiff's lack of knowledge concerning the alleged contract deficiencies or lack of opportunity to obtain the knowledge that would have revealed what plaintiff claims that it learned only after its "voyage of discovery." Defendant charges plaintiff with the knowledge attributable to any sophisticated aerospace contractor, arguing that plaintiff's lack of experience dealing with conversions of this nature and magnitude is a double-edged sword, the sharpest edge cutting against plaintiff's purported inability to either understand the task that it proposed or realize the implications of its claimed inexperience.

57/ Nor did defendant dispute that plaintiff "incurred the loss of which it complains here." Def.'s Br. filed Mar. 13, 2001, at 26.

Defendant challenges plaintiff's assertion that it lacked the sophistication and experience necessary to put forth an accurate technical and cost proposal. Defendant characterizes plaintiff's naivety as a self-serving litigation position and, in any event, one totally contradicted by plaintiff's own business records. These records establish that plaintiff not only understood that the task involved much more than a simple modification/refurbishment project, but also that plaintiff internally considered the necessity of implementing the kinds of manufacturing techniques that it eventually employed and earlier exercised its own business judgment in ruling them out. Consequently, even if the contract's pricing and scheduling were unachievable, plaintiff itself assumed the risk of the eventualities that came to pass.

4. Analysis

Plaintiff's theories of commercial impracticability, impossibility, and superior knowledge, to a large extent, contain overlapping elements. The court begins by treating those elements that are fundamental to plaintiff's claims and compel their rejection.

5. Reason to know that the C-23B+ was not a straightforward modification task

A crucial, and common, element in claims of impossibility, commercial impracticability, and failure to disclose superior knowledge requires the party seeking an equitable adjustment to establish that it encountered difficulties for reasons that it neither knew – nor had reason to know – when entering into the contract. Plaintiff contends that it had no reason to know that the use of a production process for a straightforward modification task would be insufficient to complete the conversion required by the SOW. The evidence is overwhelmingly to the contrary. Most striking is plaintiff's guileless protestation that the modifications set forth in the SOW were simple. Plaintiff's own expert in aerospace manufacture, Mr. Haggerty, substantiated that the SOW contemplated "clearly a significant remanufacturing job." Tr. at 132. Although the thrust of his testimony was that it was obvious that the conversion was a remanufacturing job, he also established that the SOW set forth a major task that any proposer could appreciate. His description of the contract resounds:

> As we just discussed, the magnitude and scope of remanufacturing far exceeds refurbishment and simple modification. The statement of work for the C-23B+ required them to take a commercial airplane, cut the entire tail off, which was a single fin tail, and put a brand-new twin fin tail with rear ramp on

the aircraft, to cut another door into the airframe, to remove a 36-inch section of the fuselage, take a 36-inch section of the fuselage, cut it in two places, and take it out, but cut through, cut through all of the electrical systems, cut through the flight control tubes, to cut through the air-conditioning systems, through the hydraulics systems, shorten the airplane, and then replace all of those subsystems.

They wanted all new non-Kapton wiring, except in the wing area. They wanted a new oxygen system for the pilot, the co-pilot, and the paratroopers. The paratroopers were, required the installation of what they call a role beam . . . .

So they were putting in a large beam, and if you remember pictures of paratroopers, they all click on and dive out the door. That beam that they put on is part of that. But these were 360-pound paratroopers, not that the person was that big, but they were jumping out with probably 100, 100 pounds of weapons and ammunition and so forth.

They had to be able to install kits for 15 NATO litters, these are ambulance-type litters for wounded soldiers. They had to be able to put in cargo handling, cargo drop kinds of provisions. They had to put in all new, 37 items of new electronics that were required to be installed in the cockpit.

. . . [T]here was another list of 38 items of time limited nature, like the landing gear, that . . . needed 1,200 hours of time remaining, and batteries, and fire extinguishers and so forth. And then in addition to that, there was refurbishment. It had to be cleaned. It had to be painted. They had to rehabilitate the pilot and co-pilot seats, the upholstery, and so there were those minor cleanup things.

But these large items, clearly the magnitude and scope of these changes was not a simple refurbishment or mod job. This was clearly a significant remanufacturing job.

Tr. at 131-32. But Mr. Haggerty had not completed canvassing the tasks:

> I forgot to mention in the discussion that the engines had to come off, and the engines had to be overhauled too . . . .
>
> And the other piece of this was that they had to do an engineering analysis and a fatigue analysis to determine that the total airframe, the total airframe would in fact last 12,000 hours of flight time more after it completed. And that is something that's not done on a simple refurbishment job or a simple STC mod kit.
>
> And that requires a complete analysis of the fuselage and the frames and everything else and the role beam and all that to make sure that the total aircraft will last 12,000 hours.

Tr. at 133. Even if plaintiff did not understand the concept of "remanufacturing," it certainly cannot sustain the position that the SOW, in terms of the modifications called for, depicted anything other than a major project.

Plaintiff also knew that it had never performed modification work of this nature or scale, and it understood full well that it was using a subcontractor whose experience was far less than its own. Thus, Mr. Nesbitt's testimony that "Shorts had never done remanufacturing before," Tr. at 1067, while that may be true, does not imply that plaintiff had no understanding of the scope of the work content in the SOW.

For example, one of the so-called "out of scope" work items was the need to remove a large portion of the roof and replace it. The plan, according to Messrs. Cowan and Nesbitt, was to remove a small portion of the roof and reposition the air-conditioning. Because the roof was tightly sealed, WVAC could not accomplish this task without tearing the skinned roof. It was easier to remove an entire section and replace it, which is how plaintiff proceeded. When questioned on direct-examination as to why plaintiff did not know that the roof would tear, Mr. Ballard responded:

> We had never had occasion to take any parts off – well, maybe in the production assembly at Belfast, we may have had to remove parts if something was wrong with the part, but at that stage, everything we put together was wet, the sealants hadn't set, the material between the two parts hadn't set, but we're

now dealing with aircraft that had been in service for quite some considerable time.

In that environment, . . . they were baked on, they were frozen on, and they just wouldn't come off.

Tr. at 2519.

"[I]f we did a prototype, we'd have found all this out, but we found it out during the course of performance of the job itself[,]" Tr. at 1117, according to Mr. Nesbitt. That the critical information could have been conveyed through a prototype does not prove that plaintiff had no reason to know when it submitted its proposal that the sealant would cause this problem. As Mr. Cowan admitted, "[w]e never tried to take apart anything that was covered in that sort of sealant[.]" Tr. at 3002. Because plaintiff knew that it had never performed this operation, the court cannot say that it was reasonable for plaintiff to assume that the roof would not tear.

Another major problem encountered during performance was the mismatching of the joints when WVAC attempted to realign the fuselage after the cuts. Mr. Cowan, to whom plaintiff assigned responsibility for engineering management at WVAC, was asked:

Q. How did Shorts' lack of remanufacturing knowledge impact this issue?

A. We had never cut up an airplane before in that sense. We weren't aware, because it was never a problem when we were building 3-60s, Sherpas, 23A, Bs, UTTs, 3-30s, when we were building them from new, the corrugations were within limits that were acceptable. Occasionally, we had minor problems with joint alignment, but to the extent of instead being a 20/1000ths of an inch mismatch, it was 30/1000ths.

It was a little bit bigger than we expect, but not 10 times, which is what we had to deal with quite a lot of the time in B+. So from a brand-new airplane point of view, we'd never experienced that, and because we'd never had a big problem with it, we didn't know to go look for that or be prepared for that issue even.

> Once we came across the first airplane and tried to align it, a bit of research then generated what was causing the problem.

Tr. at 2991-92. Given this testimony, the court cannot find that plaintiff had "no reason to know" that cutting an aircraft in two and removing an entire section of the fuselage might create problems, even significant problems, during realignment. Plaintiff had reason to know that it was applying its "brand-new airplane point of view" to aircraft that were far from "brand new." That much was understood from the beginning; for example, the "Introduction" to the January 9, 1991 Preliminary Business Plan stated: "Shorts is now proposing to re-configure 330 aircraft which have been in passenger and civilian cargo service for the past seven to fourteen years to a specification very close to the C-23B[.]" Mr. Crawley, who led the Belfast team in assisting ATCOM to develop the SOW, confirmed that plaintiff would have been expected to "assess the implications" of the need to develop the process of the cuts and rejoining after award:

> Q. So you knew then that Shorts was by contract saying we will develop a way to remove this 36 inch forward fuselage section and rejoin it the way it should be done; right?
>
> A. That's correct.
>
> Q. Okay. At the time that the Statement of Work, or that you were involved in the statement of work leading up to the award of the contract, did you participate in any effort by Shorts to further define exactly what was going to be involved in that forward fuselage aspect of the contract?
>
> A. No, that was not a part of my responsibility.
>
> Q. Do you know if anybody at Shorts did?
>
> A. I'm not personally aware of it. I would have expected them to look at things and assess the implications in broad terms.

Crawley Dep. ¶¶ 235-37.

The facts are that plaintiff had manufactured the SD3-60 and had knowledge about the properties of the sealant and the effort required to rejoin two pieces of the fuselage. Mr. Cowan explained how rejoining the fuselage of used planes would not be a neat fit due to problems with alignment. Tr. at 2990. Plaintiff had more than a sufficient basis from which to conclude that it could not make these kinds of assumptions without an investigation that was not undertaken, although it had every incentive to do so. Mr. Ballard's Red Team did not trouble-shoot the project sufficiently or thoroughly. Not knowing the properties of the Bostic sealant – how it would behave over time in different environments and its probable effect on removal of the roof – was inexplicable.

What plaintiff failed to do to prepare an accurate technical and cost proposal prior to award is evidenced by what plaintiff did after award. The type of assistance that Mr. Ballard provided in his trip to WVAC in November 1993 went well beyond Mr. Cowan's and his efforts in July 1993. Mr. Ballard testified that it was only during his visit to WVAC in November 1993 that they "started to look in-depth of what we intended, or what was going to be required to remove from the aircraft[.]" Tr. at 2772. Although he maintained that plaintiff was not able to make that assessment until after award when he and others at WVAC were able to "view some of the SD3-60 and SD3-30 aircraft that were in the hangar at the time," Tr. at 2721-22, he offered no convincing explanation as to why plaintiff had no way of looking "in depth" prior to submitting its proposal:

> Q. Why wouldn't somebody go and do what you did in November 1993 before they submitted their bids?
>
> A. I think it's only when we got to 1993, and we started to look in some detail at the aircraft, we looked at the aircraft with the panels removed in the facility, we went and looked at the C-23B that was stationed at the Air Center, and it was only when we looked seriously into the aircraft regarding the removal of the systems that it was, what they – they were learning what they needed to do.

Tr. at 2723. Significantly, Mr. Ballard testified that WVAC had several SD3-30 and SD3-60 aircraft in the facility during Mr. Cowan's and his trip to WVAC in July 1993. Tr. at 2467.

Not only should plaintiff have assisted WVAC in the manner exhibited by Mr. Ballard's visit in November 1993, but plaintiff also should have involved its Operations Department with the proposal planning as it later did in February 1994. At that time Mr. Nesbitt sent Norman Richmond, a Belfast engineer in the Operations Department, to WVAC. Among other problems, Mr. Richmond advised about how WVAC could achieve line balancing, as he described in his undated report from that visit admitted as DX 1328. Mr. Nesbitt testified that line balancing is "something that you would look at in a manufacturing environment" and that PALS was not experienced in line balancing. Tr. 1312-13. That was Mr. Nesbitt's reason for dispatching Mr. Richmond from Operations to WVAC. Id.

Mr. Richmond also explained in his undated report that, "[t]o date, the majority of the Air Centre's work would appear to be of maintenance type, with little thought as to how they would plan / organise / monitor & control the C23 B+ work package, at operations level." DX 1328, at 2. Consistent with this impression, Mr. Richmond also reported that the "shop floor control for issue & monitoring of work" then in place at WVAC "may be suitable for the current maintenance & one off type repair /modification contracts, but it is not suitable for a production run type contract over a number of aircraft, i.e. the C23 B+ contract[.]" DX 1328, at 6.

If Mr. Richmond could appreciate, even before the start of work on aircraft 1, that the C-23B+ project was a "production run type contract" in need of operations-style control, plaintiff is chargeable with this knowledge before award. Plaintiff had reason to know of the incongruence between WVAC's preparation and understanding of the project and the actual production needs of the contract. As for the need for line balancing, this court understands that line-balancing could not be achieved until the methods planning was underway after award, and thus it would not have been possible for plaintiff to balance the line before contract award. However, plaintiff had reason to know that line balancing and other production processes would be necessary. Other problems documented in Mr. Richmond's report also led to the delayed start of the first aircraft.

Another task that plaintiff did not assess adequately was O&A work. Much of the overages on O&As relate to the age of the inducted aircraft. Plaintiff knew that it was dealing with old aircraft, and it understood that unexpected surprises could and would occur, but plaintiff nevertheless exercised its business judgment in estimating what the costs of such problems could be when it agreed to a ceiling price on the CLIN 3 for the O&As. Because it had never performed a remanufacturing contract, plaintiff explains that it totally underestimated the extent of required O&A work. Mr. Nesbitt testified, for example, that, due to the degree of tear down required, plaintiff found corrosion in unexpected places. Tr.

at 1097. According to Mr. Cowan, while plaintiff anticipated some corrosion in certain areas of the aircraft, "[e]verything else was new to us." Tr. at 3012. In his opinion, had plaintiff used a prototype, it "probably would have found most of the general corrosion" which – referring to the knock-on effects of corrosion problems – "would have made a big difference, again, from a parts ordering point of view." Tr. at 3013-14. Mr. Haggerty confirmed that only an experienced remanufacturing company could anticipate the extent of corrosion on the used donor aircraft.

Plaintiff is an experienced aircraft manufacturer; since 1989 it has been part of the third largest aerospace manufacturer in the world. Presumptively, plaintiff had access to information from other manufacturers. For example, Mr. McCoy used Boeing as a touchstone for his opinion that plaintiff's calculation of costs would have been incurred by any aircraft manufacturer for the C23-B+ conversion. Because the donor aircraft had been in use for years the court cannot find that plaintiff had no reason to expect that it would encounter significant problems. Plaintiff knew enough to appreciate that it did not know what it might find, and consequently plaintiff certainly had every reason to conduct as thorough an investigation as possible before agreeing to a ceiling price on the O&As.

The tear down procedures are another example of knowledge chargeable to plaintiff. Although plaintiff completed a much more extensive tear down than it had planned, plaintiff also knew, from the very beginning, that it could not even plan the tear down procedures accurately without having the aircraft in hand, the detail design drawings, and the tear down manual. Again, Mr. Ballard made this point when discussing the November 1993 trip:

> Q. How could you plan teardown without design drawings and a teardown manual?
>
> A. We were limited in what we could do. There was limited teardown of the aircraft for the purpose of maintenance, and that was detailed in the teardown manual. So that was the extent of which we could pre-plan the teardown to those activities that would be listed in the maintenance manual.
>
> Q. . . . [W]ould you need to have aircraft in order to finalize what you need for teardown?

> A. Yes, you would. You could do a certain amount from the documentation, from the bill of material – or from the illustrated parts catalog, but it would not be until you had an aircraft in your hands and physically carried out the task that you would have, you would really be able to establish what was required.

Tr. at 2490.

Whether it was possible to accomplish methods planning prior to award to the same extent that was accomplished during November 1993, plaintiff knew what would be required to estimate this, and other, tasks properly. It is telling that, after Mr. Ballard walked WVAC through the task elements after award, WVAC immediately became concerned about its estimates, as Mr. Ballard noted in his November 1993 trip report: "I was conscious of [WVAC's] unease with the estimate they had for labour hours to convert each aircraft."

Plaintiff did assist WVAC with its estimates prior to award. Mr. Ballard, whose role in helping WVAC actually plan for the arrival of the first aircraft after award was so fundamental, gave an assessment as of July 1993:

> I believed the approach they were taking was a very sensible approach to the project, and I understood that prior to my arrival at WVAC, that Belfast had sent out a team of people to assess what exactly they were doing in terms of auditing the hours that they believed it was going to take to do this project, and I didn't have any cause to go in and re-estimate that.
>
> But based on the fact that Belfast had already carried out that exercise, it did appear to me that the value of hours they were looking at, the type and scope of work they were looking at were very much in balance.

Tr. at 2471. Yet, Mr. Ballard, the methods engineer who worked most closely with WVAC to create the actual planning after award, was not the one reviewing the technical content of the proposal prior to award. It also bears mentioning that plaintiff relied heavily on an inexperienced subcontractor to create the WBS – without providing WVAC the kinds of assistance that Mr. Ballard described were provided after contract award.

6. Assumption of risk

Another common element to plaintiff's claims is that the party seeking equitable adjustment cannot bear the risk of the contingency that befell it. Relevant factors, although not necessarily controlling, are the type of contract that plaintiff executed and the nature and party responsible for content of the specifications.

1) Firm fixed-price contract

Of particular import in the court's assessment of the allocation of risk is the fact that the contract is firm fixed-price. When a party enters into a fixed-price contract, risk is allocated to the party seeking discharge. Seaboard Lumber Co., 308 F.3d at 1295 (stating that because plaintiff had entered into fixed-price contract, it also bore risk that the market would slump). It is well-established that "[a]bsent unusual circumstances a 'fixed-price contractor . . . shoulders the responsibility for unexpected losses, as well as for his failure to appreciate the problems of the undertaking[.]'" Sperry Rand Corp. v. United States, 475 F.2d 1168, 1175 (Ct. Cl. 1973) (quoting Macke Co. v. United States, 467 F.2d 1323 (Ct. Cl. 1972)). In a fixed price contract, "the contractor assumes responsibility for his costs, with the inevitable risk that greater costs will be incurred than were anticipated, and that the contract will result in loss rather than profit." A. C. Ball Co. v. United States, 531 F.2d 993, 1007 (Ct. Cl. 1976). Government contracts experts John Cibinic, Jr., and Ralph C. Nash, Jr., have described the parameters of the risks associated with firm fixed-price contracts:

> In the pure fixed-price contract, the bargain is stated in terms of a fixed amount of compensation with no formula or technique for varying the price in the event of unforeseen contingencies. . . . Firm-fixed-price contracts must be used with caution because both parties can lose if the actual costs of performance are greatly at variance with the contract price. If the costs greatly exceed the price, the contractor will incur a substantial loss and may be financially unable or unwilling to complete the work at the contract price. . . . If the costs are far under the price, the Government will have paid substantially more for the work than might have been possible under some other form of contract.

John Cibinic, Jr. & Ralph C. Nash, Jr., Formation of Government Contracts 1080 (3d ed. 1998).

The evidence shows that plaintiff wanted this contract enough not to balk at the type of contract and its obvious constraints on the costs that plaintiff could incur and still make a reasonable profit. Plaintiff believed that the parties had negotiated a fair price, but Mr. Brundle testified that plaintiff was "surprised" to learn that the Government in 1992 had valued the aircraft at $6.1 million when it told plaintiff that the value was $4.6 million. Tr. at 3939. Plaintiff's team negotiated in good faith. That Contracting Officer Mead saw his mission as driving down the price, however, does not show that ATCOM failed to do so. Plaintiff understood that it was accepting risk, it knew WVAC was a relatively new and inexperienced company, and it deemed the performance risk on the contract was low to moderate because the project was well-defined and both WVAC and plaintiff had experience in refurbishment/modification.

Plaintiff entered into a firm fixed-price contract after full opportunity to evaluate the contract type, 58/ even when plaintiff had reservations about the risks involved, particularly with respect to WVAC's capability to perform. Based on the findings of fact set forth above, the court finds that plaintiff was aware that it was taking risks – as well as the nature of the risks – when it entered into a fixed-price contract that allocated to the contractor the risk that it could incur substantial loss.

2) Responsibility for – and nature of – the specifications

The parties do not expressly dispute the characterization of the specifications in the contract; they both understand the contract to contain mixed design and performance specifications. However, the creation of the specifications – both in terms of authorship and assurances – is relevant under the analysis of assumption of risk proposed by plaintiff as stated in Foster Wheeler Corp. v. United States, 513 F.2d 588, 598 (Ct. Cl. 1975). The analysis queries, in part, "[W]hich party took the initiative in drawing up specifications and promoting a particular method or design?" Foster Wheeler, 513 F.2d at 598. It also implicates cases such as Bethlehem Corp. v. United States, 462 F.2d 1400 (Ct. Cl. 1972), and Austin Co. v. United States, 314 F.2d 518 (Ct. Cl. 1963), wherein contractors' claims of impossibility failed on analyses of the assumption of risk which turned, in part, on who drafted the specifications and where the reliance lay.

58/ Although ATCOM may have been restricted to a fixed-price contract, plaintiff was not obligated to enter into the contract.

The factual findings recited above reveal that plaintiff contributed substantially to the content of the SOW. Contracting Officer Mead and plaintiff's witnesses all agreed on this point, although the Guard determined the performance requirements of the C-23B+, *e.g.*, that it must function as a C-23B, and that it had to accommodate a paratrooper with a total 360-lb. weight, SOW § 3.2.5.6.2. While ATCOM established the delivery requirements, they were a working assumption of plaintiff from the outset. 59/

With respect to the nature of the specifications, the Federal Circuit has described the distinction between performance design specifications:

> The difference between performance specifications and design specifications is well established. Performance specifications "set forth an objective or standard to be achieved, and the successful bidder is expected to exercise his ingenuity in achieving that objective or standard of performance, selecting the means and assuming a corresponding responsibility for that selection." Design specifications, on the other hand, describe in precise detail the materials to be employed and the manner in which the work is to be performed. The contractor has no discretion to deviate from the specifications, but is "required to follow them as one would a road map."

Blake Constr. Co. v. United States, 987 F.2d 743, 745 (Fed. Cir. 1993) (quoting J.L. Simmons Co. v. United States, 412 F.2d 1360, 1362 (Ct. Cl. 1969)). The court concludes that the contract contained some elements of design specifications, as some provisions listed exactly what modifications were to take place, but largely contained performance specifications, as plaintiff was required to select the means by which to complete the tasks that the SOW identified.

P.R. Burke Corp. v. United States, 277 F.3d 1346, 1357 (Fed. Cir. 2002), exemplifies how the Federal Circuit views this distinction. This case involved a contract for repair and improvement of a sewage treatment facility. One provision required the contractor to "plan and schedule the manpower, materials and methods of construction necessary to complete the Project as specified[;]" the project description in the contract stated "[t]he work includes

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59/ Plaintiff had several years not only to take issue with the constraints of the delivery requirements, but also to become aware, through the proposal process, that they were unrealistic. The evidence showed that plaintiff wanted to assure a transition from the C-23B to the B+ that was seamless with continued delivery of C-23B+ aircraft.

the furnishing of all labor, approved materials, and equipment required for [the project] . . . and all the necessary appurtenances to make the facilities fully operational." P.R. Burke Corp., 277 F.3d at 1357. The contract also required that the sewage facility remain operational throughout performance. Because certain contract drawings called for construction that, according to the contractor, could be accomplished only by shutting down the facility, the contract contained design specifications. The Federal Circuit ruled against plaintiff's argument based on the pleadings: "[N]othing in the contract's description dictates the '*manner*' in which [the contractor] must perform[.]" Id.

The contract in the case at bar does not contain the explicit provision found in P.R. Burke that stated that the contractor would plan and schedule the manpower, material, and methods of construction necessary to do the project. Section C-3 nevertheless does provide that the contractor "shall furnish all services . . . necessary to accomplish the manufacturing effort described in the Statement of Work" and that "[t]he contractor's manufacturing effort shall be accomplished in accordance with government approved specifications." It also appears to go further than P.R. Burke's contract because it established, to some extent, a "road map" that plaintiff was required to follow. The road map required plaintiff to complete a tear down inspection of the aircraft, use the results of that to "determine the level of effort required to refurbish" and repair the aircraft, SOW § 3.2.1(a), complete the defined modifications, test the functioning of the aircraft to ensure that they met the specifications, and deliver the aircraft.

The development of the WBS to implement each of the performance requirements spelled out in the SOW fell exclusively to plaintiff. The SOW requires:

> The contractor shall modify Shorts SD3-60 commercial aircraft to conform to the C-23C Sherpa Type Specification. The contractor shall obtain FAA certification for all modifications, except Military Airworthiness Qualification Items as defined by this SOW.
>
> The C-23B+ aircraft shall be modified to the same external configuration (form, fit, and function) as that defined in the C-23B Type Specification (unless specified differently in this contract or the C-23C Type Specification.) The contractor shall prepare and submit a complete list of aircraft modifications required to convert the commercial aircraft to the C-23B+ configuration according to the CDRL (DI-MISC-80508).

SOW § 3.2.5.11.

From this description of what the contract required plaintiff to accomplish, the SOW lists and describes, in varying detail, the necessary modifications; it qualifies the list of modifications by stating that "[m]odifications shall include, but are not limited to the following[.]" While not all-inclusive, the list of external modifications includes modifications to the engines, the rear and forward fuselage, the tailguard, antennas, the fuel tanks, and skin reinforcing. See SOW § 3.2.5.11.1(a) - (k). The provision defining the modifications to the rear and forward fuselage, for example – describing the removal of the 36-inch section of the fuselage and the replacement of the tail – reads, as follows:

> b. Rear fuselage: Remove SD3-60 rear fuselage to the rear of the passenger cabin, single vertical stabilizer and horizontal stabilizer. Replace with new parallel section aft fuselage and twin vertical stabilizer empennage to C-23B+ configuration.
>
> c. Forward fuselage: Remove a 36 inch section from the forward fuselage between flight deck and wing to achieve C-23B fuselage geometry. The contractor shall perform all actions required to rejoin the aircraft to include: sheet metal, structural, wiring, control systems and all other affected systems.

SOW § 3.5.11.1(b) & (c).

As readily apparent from these excerpts, although the SOW lists the required internal/external modifications, the modifications themselves are not detailed and in many instances describe the type of modification required, leaving the details of the process for the modification to the contractor. Other SOW provisions of similar import have been quoted in the recitation of facts. Even in its complaint, plaintiff conceded that the "procedures and processes . . . had to be developed during the Contract performance." Compl. ¶ 166.

The repeated reference to the list of modifications as non-inclusive ("these modifications include, but are not limited to:") is revealing. The SOW says nothing about how, for example, the contractor should perform the 36-inch cut, only that the cut be made somewhere "between flight deck and wing to achieve C-23B fuselage geometry[,]" SOW § 3.2.5.11.1(c), that "[t]he contractor shall perform all actions required to rejoin the aircraft,"

SOW § 3.2.5.11.1(c), and that "[t]he contractor shall modify all original aircraft systems . . . affected by removal of the 36 inch forward fuselage section." SOW § 3.2.5.11.2(g)(1). As Mr. Ballard – plaintiff's methods engineer present at WVAC in November 1993 after award – testified, the design engineers would determine where the cuts would take place, and only then could the methods planners at WVAC plan what systems had to be removed. After award, but before release of the detail design drawings, WVAC could only make "approximations":

> And while engineering design was not available to us, therefore we did not know exactly where the cuts were going to take place in the fuselage, we were able to make an approximation of where they were going to take place.
>
> So we did some work and some preliminary work in trying to identify what was in the way of those cuts and what might have to be removed to facilitate those cuts.

Tr. at 2476. Had the SOW described that manner in which the cuts would take place, WVAC and Mr. Ballard would not have addressed planning system removal based on assumptions of where plaintiff would later determine where the cuts would be made. 60/

60/ Even to the extent that the subject contract contained design specifications, performance specifications are not converted into design specifications. See Penguin Indus. v. United States, 530 F.2d 934, 937 (Ct. Cl. 1976). The Court of Claims ruled in Penguin Industries that certain aspects of contract drawings that did not indicate the method of glueing were not defective. The court characterized that aspect as "more like a 'performance' contract than a 'design' specification and, as in a performance contract, the contractor must assume responsibility for the means and methods selected to achieve the end result." Id. at 937.

Insofar as plaintiff contends that the specifications were detailed insufficiently, the Court of Claims rejected that proposition long ago in Sylvania Elec. Prods., Inc. v. United States, 458 F.2d 994, 999-1000 (Ct. Cl. 1972): "Every detail and contingency of construction cannot be known in advance, and the contract does not, as plaintiff charges, become a pig in a poke for failure to state every such detail where a definite standard is laid down for what is to be built and furnished."

Because the parties' contract contained performance specifications with some design specification features, the risk of any difficulty with performing the contract is assumed by the contractor. See J. A. Maurer, Inc. v. United States, 485 F.2d 588, 595 (Ct. Cl. 1973) ("[I]f the contractor, from a stance of superior expertise, asks for and obtains leave to perform according to methods defined and stated by him, he impliedly warrants that he is able to overcome the technical difficulties inherent in the project, whatever they are."). It was plaintiff, not ATCOM, that had the greater expertise with respect to the C-23B+ project. While neither party previously had attempted this specific conversion and ATCOM admittedly had participated in remanufacturing programs, plaintiff had adequate technical knowledge concerning both the donor aircraft and the type of aircraft to be produced.

The seminal cases of Bethlehem Corp. v. United States and Austin Co. v. United States support this conclusion. See Bethlehem Corp. v. United States, 462 F.2d 1400, 1404 (Ct. Cl. 1972) (contractor who did not itself prepare specifications, but assured government specifications were realistic, assumed risk of nonperformance); Austin Co. v. United States, 314 F.2d 518, 520-21 (Ct. Cl. 1963) (contractor assumed risk of impossibility of substituted specifications it drafted). In both cases the contractors assumed the risk of its performance. In Bethlehem Corp. the contractor "was aware that it was being consulted as a leading expert in environmental chamber manufacture and that the Government's project engineer was not an expert in that area." 462 F.2d at 1404. In Austin Co. the contractor "revised its proposed changes [to specifications] and assured the defendant that a contract based thereon would be performed and additionally would result in a system of greater precision than that originally required by defendant." 314 F.2d at 520. Here, too, ATCOM asked plaintiff if it could produce more C-23B aircraft. Plaintiff said no, but that it could produce the C-23B+ aircraft in the manner that plaintiff proposed. In such circumstances plaintiff is responsible for its proposal, notwithstanding ATCOM's approval of plaintiff's estimates and plans for conversion.

3) Significance of the term "modify"

The fact that the SOW uses the term "modify" became a mantra. The court addresses whether that term has any bearing on the nature of the specifications. Examination of the express terms, specifications, and drawings of the contract constitute pure contract interpretation, resolvable as a matter of law. See P.J. Maffei Bldg. Wrecking Corp. v. United States, 732 F.2d 913, 916 (Fed. Cir. 1984) (ruling that review of contract specifications presents question of law).

Despite the nature of the specifications, plaintiff can point to language in the SOW that requires the use of a modification effort, as opposed to what plaintiff calls a "remanufacturing effort." Because contract interpretation requires the court to begin with the plain language of the contract, Textron Defense Sys. v. Widnall, 143 F.3d 1465, 1468 (Fed. Cir. 1998); Gould, Inc. v. United States, 935 F.2d 1271, 1274 (Fed. Cir. 1991), the starting point is to ascertain whether the contract uses the term "modification" or "remanufacture."

A review of the final SOW, which, as it became part of the contract, is essentially the same as the initial SOW contained in the RFP, along with the other relevant provisions of the contract, reveals that the contract does not use one particular term consistently, as the scope provision suggests. Overall, however, the terms "modify" or "modification" predominate. The type of effort required is set forth initially in the scope provision of the SOW, which provides, in part, that the SOW "establishes the contractor requirements for procurement, refurbishment and modification of Shorts SD3-60 commercial aircraft, into C-23B+ aircraft[.]" SOW § 1.0. The scope provision also recites that "[t]his SOW includes the design, development, and manufacture of modifications and installation of those modifications to convert the SD3-60 aircraft into C-23B+ aircraft." SOW § 1.0. The court does note that this scope provision states that the work requires both refurbishment and modification. However, throughout the contract, the terms "refurbish," "modify," "convert" and "manufacture" appear as descriptions – either partial or in summation – of the type of effort required.

Section 3.1.1.1(b), for example, states that "[t]he useful life after modification shall exceed 12,000 flight hours[.]" Section 3.2.2 directs that the SD3-60 aircraft would be "modified to a standard based on the C-23B configuration." Section 3.2.5.11 states that the "contractor shall modify Shorts SD3-60 commercial aircraft to conform to the C-23C Sherpa Type Specification." The section also directs that the C-23B+ aircraft "shall be modified to same external configuration . . . as that defined in the C-23B Type Specification" and that the contractor "shall prepare and submit a complete list of aircraft modifications required to convert the commercial aircraft." CLIN 2, section 3.2 of the SOW, is entitled "C-23B+ Aircraft Modification/Configuration and Qualification/Certification."

"Modify" and "modification" are not the only terms used. For example, section C-3 of the contract states that the contractor "shall furnish all services . . . necessary to accomplish the manufacturing effort described in the Statement of Work" and that "[t]he contractor's manufacturing effort shall be accomplished in accordance with Government approved specifications." However, section E-3, delineated "In-Process Review," states that

"[w]ithout limitation of the right to inspection . . . the Government may perform an in-process review on the aircraft being remanufactured." 61/

Although the terms "refurbish," "manufacture," and "remanufacture" are used to describe the type of effort required for the creation of the C-23B+ aircraft, the contract states that the contractor shall furnish the services necessary to accomplish the manufacturing effort described in the SOW. The SOW is replete with references to the project as a modification effort, but the rules of contract interpretation dictate that the court read the contract's provisions as a whole, seeking to render an interpretation that accommodates all of the contract's terms. Were the court merely to state that because "modification" appears to be the predominant concept for the effort required to create the C-23B+ aircraft, the court would ignore the other terms that describe the tasks to be performed.

These different terms, according to their plain meaning, have significant distinctions. The term "modification" is defined as "[t]he action or an act of making changes to something without altering its essential nature or character[.]" The New Shorter Oxford English Dictionary 1804 (thumb index ed. 1993). "Manufacture" means to "[m]ake or fabricate from material; produce by physical labour or machinery[.]" Id. at 1691. "Refurbish" means "[b]righten up, clean up; renovate; restore[.]" Id. at 2525. "Remanufacture" is not a word included by this authoritative dictionary. As such, it has no "plain meaning." Plaintiff takes the position that remanufacture, as well as the other terms, have special meaning in the industry.

According to Mr. Haggerty, the term "remanufacturing," as used in the aerospace industry, "involves a significant change to the airplane." Tr. at 126-27. He explained the concept, as follows:

> [In remanufacturing,] [n]ormally, the airline or military service wants brand-new mission capabilities, and they want to extend the life another 10 or 20 years. In order to fulfill that requirement, the airplane is brought into the factory completely stripped down, all the equipment removed, all the subsystems taken out, and the fuselage is stripped of its paint, x-rayed, ultrasound inspected for cracks and so forth in the composite parts. The engines are removed, the engines are either replaced or sent out for overhaul.

61/ While the term "remanufacturing" may have been removed from the SOW, it appears at least once in another section of the contract.

> The necessary changes to the fuselage are made. . . . So there's normally significant fuselage changes . . . . In addition to that, almost always, there's a great change in electronics, and we call them aviation electronics or avionics, we put in new radars, new communications, new navigation. In the military world, we put in defensive avionics. That normally takes new wiring.

Tr. at 127-28. Mr. Haggerty contrasted this definition of the term "remanufacture" with the terms "refurbish" and "modify":

> The refurbishment is a much simpler, straightforward job. It normally does not require removal of subsystems. Refurbishment typically is cosmetic, talks about cleaning surfaces, painting surfaces, removing surface type corrosion, surface type scratches, dents, missing rivets, things that are easily detected without pulling up floorboards, without taking fairings off, without taking hatches off, without taking landing gears off and so forth. So the amount of disassembly is minimal.
>
> The modification . . . typically is in a commercial environment the application of what we call FAA supplemental type certificate kits, STC kits, where a package would arrive, it might be a new radio or a new automatic collision avoidance system, and the cockpit would be modified, and that little subsystem would be tested, as opposed to testing all of the subsystems in the airplane, which would be required on a reman[ufacturing] program.
>
> The reman[ufacturing] program, in order to extend the life 20 years, has to [have] all of the subsystems removed and the fuselage inspected to make sure that it[] doesn't have cracks.

Tr. at 129-30.

Mr. Haggerty distinguished the term "modification" from "remanufacture" in two ways: the nature and degree of change required and the types of processes required to perform the changes. In other words, a modification task by definition does not require operations like full tear down and removal of all subsystems, because the changes required by the task are not of sufficient significance. In contrast, a remanufacturing effort, by

definition, calls for major modifications, such that the only means of accomplishment would involve a full tear down, systems removal, and so forth.

These industry definitions do not displace the plain meaning of the contract, nor do they vary the meaning of these terms. 62/ Where the provisions of the Agreement "'are clear and unambiguous, they must be given their plain and ordinary meaning,' and the court may not resort to extrinsic evidence to interpret them." McAbee Constr., Inc. v. United States, 97 F.3d 1431, 1435 (Fed. Cir. 1996) (quoting Alaska Lumber & Pulp Co. v. Madigan, 2 F.3d 389, 392 (Fed. Cir. 1993)). The Agreement "must be considered as a whole and interpreted so as to harmonize and give reasonable meaning to all of its parts." NVT Techs., Inc. v. United States, 370 F.3d 1153, 1159 (Fed. Cir. 2004). Plaintiff cannot show that the contract is other than "clear and unambiguous" with respect to whether, by its own definition of the terms, a "modification" process was required versus a "remanufacturing" process. The term "modify" appears more times in the contract and is used even in the scope provision, but harmonizing the provisions of the contract yields an interpretation that the contract uses the term "modify" to identify the tasks, but not to delimit or specify the means of performance. Nor did the concept of a "modification" effort mislead plaintiff into underestimating the time and costs involved in accomplishing the conversion.

The contract, read in its entirety, did not use the word "modify" to describe the means of production that would be required. That the means of production were left to the contractor's discretion – to be embodied in its proposal – is confirmation. The contract makes no sense in any other way. If, for example, the contract required plaintiff to install new furnishings into the passenger cabin, but used the term "remanufacture" in the scope provision, the contract would not be rendered ambiguous. The contractor could not sue for its overruns because it relied on the scope provision when it set up an entire remanufacturing production line. As defendant correctly – though perhaps too majestically in the summary judgment phase – argued, "the parties' choice of one word to describe the work, as opposed to the entire contents of the [SOW], is utterly irrelevant." Def.'s Br. filed Aug. 24, 2001, at 11.

62/ It is proper to consider the industry definitions of these terms because they do not differ from their ordinary meaning. In Buchanan v. Department of Energy, 247 F.3d 1333, 1339 (Fed. Cir. 2001), the Federal Circuit restated its earlier holding in Jowett, Inc. v. United States, 234 F.3d 1365, 1369 (Fed. Cir. 2000), as "holding that evidence of custom or trade usage may not be used to vary the meaning of an unambiguous term in a contract unless the evidence shows an accepted industry meaning different than the ordinary meaning[.]"

4) Effect of reliance on governmental assurances

Plaintiff contended that it relied, to its detriment, on ATCOM's consistent assurances, both that WVAC had the ability to handle the task and, more fundamentally, that the C-23B+ project was a "relatively straightforward refurbishment modification program." Tr. at 632. This reliance, according to plaintiff, should negate the drawing of any inference that plaintiff "should have known" about the true nature of the contract or should otherwise relieve plaintiff of any duty to investigate on its own – or to inquire further of ATCOM.

Mr. Maguire testified that ATCOM Contracting Officer Mead, Program Manager Williams, and Mr. Lutz, the engineer, always characterized the project in this fashion during their discussions with plaintiff. Tr. at 632. 63/ He attributed ATCOM's reduction in plaintiff's proposal cost and learning estimates during the should-cost audits to ATCOM's belief that the project was straightforward. Tr. at 637-38. He recalled Mr. Mead's comments during negotiations that "there was so much fat on our proposal, there was no cost risk." Tr. at 648. That was what Mr. Mead wrote in his contract negotiation strategy notes, dated August 7, 1993: "So much fat in proposal that 15% profit is ridiculous/[plaintiff] has no cost risk[.]" These comments from Mr. Mead during negotiations, whether they conflict with ATCOM's own behind-the-scenes assessments, are in line with the consistently positive feedback from the should-cost audits. In his explanation of how ATCOM downplayed the difficulty of the project, Mr. McCoy emphasized that ATCOM's reduction of support personnel contained in the proposal also signaled to plaintiff that ATCOM viewed the conversion as a simple, straightforward modification. Tr. at 4024. 64/

ATCOM assured plaintiff before award; that much is established. This finding, however, does not overarch plaintiff's own role. It does not relieve plaintiff from its own obligations to trouble-shoot and thoroughly investigate its own proposal. Plaintiff acknowledged its own responsibility to inform itself about the nature and scope of the project by conducting multiple internal audits of its own proposal and its subcontractors' proposals and subjecting its overall proposal to Red Team review. When asked, on direct examination,

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63/ Mr. Mead agreed with the assertion of plaintiff's counsel that Mr. Mead would not call Mr. Maguire a "liar" if the latter testified that the Contracting Officer had "persuaded him that this was a relatively simple, straightforward program[.]" Tr. at 4212.

64/ Accordingly, Mr. McCoy testified: "So they were always driving us towards this being a very straightforward job in their eyes, and that's what surprised me when I [saw] the BCM and [saw] the contracting officer's assessment of the risk." Tr. at 4024.

why plaintiff so greatly underestimated the task, Mr. McCoy provided no convincing answer other than to shift blame to ATCOM:

> Q. Shouldn't Shorts, as the [Original Equipment Manufacturer] of the aircraft, or WVAC, as an experienced maintenance modification facility, have realized the necessity for doing all these extra items of work that you've been identifying?
>
> A. You would think, as the OEM, that, you know, Shorts should have known this aircraft and should have known, you know, everything about it, and they did in building the aircraft from the ground up, but going into a remanufacturing program like this that had never been taken on by them, it had never been taken on by WVAC either. . . .
>
> But [WVAC had] never been to it in this depth, and the government, through the BCM, they recognized this when they rated the technical risk as high, but that's not what they were sharing with us during the pre-contract phase of this.

Tr. at 4023-24. Unreasonable reliance on governmental assurances does not reallocate the risk to the Government when plaintiff otherwise assumed the risk of performance. Put another way, the evidence showed that governmental assurances did not displace plaintiff's own knowledge of, or reason to know, what the conversion entailed.

The court acknowledges that ATCOM gave two types of assurances: ATCOM's assurance that the contract was straightforward and fairly priced and ATCOM's approval of plaintiff's proposal. ATCOM internally had questioned plaintiff's techniques and often described the project as "remanufacturing." Nevertheless, the proposal was plaintiff's. These were plaintiff's own aircraft. ATCOM did not mislead plaintiff. ATCOM underappreciated the project from the start. Plaintiff told ATCOM that it could contract to support the Guard with its C-23B requirements by converting an SD3-30, later the SD3-60. In these circumstances plaintiff's reliance on governmental preaward "assurances" in a firm fixed-price contract were unreasonable.

7. Impossibility and Commercial Impracticability (Counts 3 & 4)

This court entered judgment for defendant on Count 3 of the complaint, which sought relief on a theory of impossibility of performance. Plaintiff's Count 4, asserting a theory of

commercial impracticability, however, survived summary judgment. Plaintiff thus tried a claim of commercial impracticability. Because of the near identicality of commercial impracticability and impossibility, plaintiff presented evidence that prompted the court to consider anew, pursuant to its authority under RCFC 54(b), plaintiff's claim of impossibility.

As explained above, these doctrines have merged over time, as courts have construed the term "impossibility" to include "impracticability." See Seaboard Lumber Co., 308 F.3d at 1294. The test devolves to proof of commercial impracticability. The Federal Circuit has applied the same test to determine whether a claim of impossibility or a claim of impracticability has been met. See id. at 1294-95.

The Restatement describes an existing impracticability, 65/ as follows:

> Where, at the time a contract is made, a party's performance under it is impracticable without his fault because of a fact of which he has no reason to know and the non-existence of which is a basic assumption on which the contract is made, no duty to render that performance arises, unless the language or circumstances indicate the contrary.

Restatement § 266(1).

65/ The parties failed to draw an important an antecedent distinction in analyzing claims of commercial impracticability and impossibility. The Restatement describes two forms of impracticability: a "supervening impracticability" and an "existing impracticability." Compare Restatement § 261, with id. § 266. As for supervening impracticability, the Restatement explains: "Events that come within the rule stated in this Section are generally due either to 'acts of God' or to acts of third parties." Id. § 261, cmt. d. It is under this category of impracticability that the Supreme Court, in Winstar Corp., 518 U.S. 839 at 905-06, endorsed the elements of the claim as set forth in the Restatement: "(I) a supervening event made performance impracticable; (ii) the non-occurrence of the event was a basic assumption upon which the contract was based; (iii) the occurrence of the event was not [the contractor's] fault; and (iv) [the contractor] did not assume the risk of occurrence." Seaboard Lumber Co., 308 F.3d at 1294-95 (citing Winstar Corp., 518 U.S. at 904-10).

These elements, as described in the Restatement and applied by the Federal Circuit in Seaboard Lumber, are not germane to this case. Plaintiff neither alleged in its complaint nor put forth evidence at trial that some supervening act of a third party caused the alleged impracticability. Instead, plaintiff directed its proof at an existing impracticability.

Plaintiff relies on the following precedents, the most recent of which is seminal, from the United States Court of Claims: Foster Wheeler Corp. v. United States, 513 F.2d 588 (Ct. Cl. 1975), Tombigbee Constructors v. United States, 420 F.2d 1037 (Ct. Cl. 1970), and Natus Corp. v. United States, 371 F.2d 450 (Ct. Cl. 1967). In plaintiff's view, these cases establish that commercial impracticability or impossibility exists when performances involved "extreme and unreasonable difficulty, expense, injury or loss involved." Pl.'s Br. filed Dec. 30, 2004, at 36 (citing Foster Wheeler, 513 F.2d at 594). 66/

Foster Wheeler involved a contractor's unsuccessful attempts to produce by the contractual delivery date boilers that met certain performance specifications. The Court of Claims found that the boilers as specified were "beyond the state of the art" and otherwise commercially impracticable because the design and production process could not be completed under any circumstances within the allotted time. Foster Wheeler, 513 F.2d at 597-98. It explained that "the convincing evidence is that neither [plaintiff] nor any other boiler manufacturer has succeeded in building a shock-hard boiler, and that the Government has retreated in its requirements[.]" Id. at 598.

In Tombigbee Constructors a construction contractor could not compact earth to the specified 95% density during the first half of the project until the Government allowed it to mix in cement. Tombigbee Constructors, 420 F.2d at 1048-51. In rejecting the Government's contention that an impossibility claim could not lie because plaintiff was able to complete the project to specification, the court stated: "The Board found that the last 5% of compaction was so difficult, costly and time-consuming as to be practically or commercially impossible to achieve in the time set by the contract." Id. at 1049. The court also rejected the Government's attack as to the weight of the evidence, remarking that "[t]he government does not point to any evidence in the record tending to show that 95% compaction could have been achieved for the entire job, without the addition of cement, in the time period allowed in the contract." Id. at 1050.

Natus Corp., 371 F.2d 450, cited in Tombigbee Constructors, involved a procurement contract for an 18-million square-foot portable steel landing mat made of interlocking panels. The mat had been produced before by two experimental contracts, but never to that size. The contract included drawings that the contractor interpreted to require the same means of

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66/ Section 261 of the Restatement describes "Discharge by Supervening Impracticability." The comments pertaining thereto are referenced, in part, by the section 266 on "Existing Impracticability or Frustration." Restatement § 266, cmt. a.

manufacture as was used in the prior contracts. Despite the contractor's difficulty in using the specified means of manufacture even assuming that other approaches consistent with the specified means were more costly, the Court of Claims held: "The law excuses performance (or, in the case of Government contracts, grants relief through a change order) where the attendant costs of performance bespeak commercial senselessness; it does not grant relief merely because performance cannot be achieved under the most economical means." Natus Corp., 371 F.2d at 457. Were the court to accept plaintiff's position that the contract provided more than just an end-product specification, and thus a warranty as to methodology, the court gave this caveat:

> The Government does not, when it directs the method of manufacture, warrant that its method can be pursued without difficulty or other unanticipated problems. The warranty, properly construed, promises only that performance is possible and within the state of the art. How that performance shall be achieved, or at what price, is a matter properly reserved for the contractor, and he may claim a breach of warranty only if the specified method demands resort to the economically unrealistic. The warranty is not breached when performance simply becomes more costly than anticipated. In short, the Government does not guarantee the contractor's profit.

Id. at 458.

That the Court of Claims ruled against the contractor in Natus and for the contractor in Foster Wheeler and Tombigbee demonstrates the verity of the oft-quoted statement from the United States Court of Appeals for the District of Columbia: "The doctrine ultimately represents the ever-shifting line, drawn by courts hopefully responsive to commercial practices and mores, at which the community's interest in having contracts enforced according to their terms is outweighed by the commercial senselessness of requiring performance." Transatlantic Fin. Corp. v. United States, 363 F.2d 312, 315 (D.C. Cir. 1966).

It is this difficulty that led the Court of Claims in Jennie-O Foods, Inc. v. United States, 580 F.2d 400, 409 (Ct. Cl. 1978), to state: "The commercial impracticability standard can be easily abused; thus this court has not applied it with frequency or enthusiasm. It is not invoked merely because costs have become more expensive than originally contemplated." The Federal Circuit continues to apply rigorous standards to such claims. See, e.g., Raytheon Co. v. White, 305 F.3d 1354, 1368 (Fed. Cir. 2002) (stating that "[e]ven assuming

the cost overrun was 57 percent rather than 24 percent, an overrun of that size does not by itself establish commercial impracticability"). Under the case law proposed by plaintiff, plaintiff failed to establish its claims of commercial impracticability or impossibility.

1) Reason to know

Because plaintiff "had reason to know" of the inadequacies of its proposal, plaintiff fails on a required element of both its impossibility and commercial impracticability claims. See Mass. Bay Transp. Auth. v. United States, 254 F.3d 1367 (Fed. Cir. 2001) ("MBTA"). The Federal Circuit in MBTA reversed a decision excusing the Government's non-performance because the Government claimed that it was impossible to obtain insurance endorsements from the design contractors for the benefit of the construction contractor. The Federal Circuit held, in part, that the Government "had reason to know, even if it did not actually know, that the insurance endorsements were impossible to obtain at the time of contracting." MBTA, 254 F.3d at 1375. The Federal Circuit recited testimony by the Government's own insurance expert that, by the time of contract execution, "'it was virtually impossible and [later] it was impossible' to obtain such endorsements." Id. at 1374. It also reasoned that the Government inserted the provision into the contract but "made no effort whatsoever to ascertain whether the endorsements were feasible to obtain[,]" and that the Government "was in a much better position" to ascertain the feasibility of the provision. Id.

Just as the Government "had reason to know" that it could not obtain the insurance endorsements in MBTA, plaintiff had reason to know that its estimates for the effort that the C-23B+ conversion required potentially could be inadequate based on the findings and for the reasons discussed above. Consequently, plaintiff did not prove this element.

2) Impracticability of performance

Plaintiff also did not establish that its case falls on the side of the line represented by Foster Wheeler and Tombigbee in terms of the requisite degree of "commercial senselessness" to warrant a finding of commercial impracticability. Plaintiff asserted in its pretrial brief that it can succeed on this claim by proving either that the "[s]chedule could not be accomplished within the time and cost objectives set" or that the "[a]ctual performance difficulty, time and cost required to perform under the specifications was so greatly disparate from the anticipated difficulty, time and cost as to render the contract commercially senseless." Pl.'s Br. filed Dec. 30, 2004, at 36.

Plaintiff claims a cost overrun of $58.9 million over the contract fixed price of $149.6 million. Plaintiff spent a great deal of time and effort informing the court of its estimates of what a reasonable contractor would have required, in terms of schedule and cost, to complete the project. Even assuming that plaintiff's estimates are correct, and that a reasonable contractor would have required over $200 million to complete the project (instead of $145 million, including profit, that plaintiff proposed), that increase – roughly 40% over the contract price – does not suffice to support a finding of impracticability. Plaintiff claims schedule impossibility because, at a bare minimum, a contractor would require forty-three months instead of thirty-five months, which represents a 23% increase. The case law does not recognize this disparity as "commercial senselessness," even if true.

3) Impracticability caused by a fact, the non-existence of which was a basic assumption of the contract

Even if the discrepancy between reality and the contract were sufficient to constitute an impracticability, plaintiff must prove more. The Restatement requires plaintiff to show that the cause of the impracticability was a fact, the non-existence of which was a basic assumption of the contract. Restatement § 266(1). As the Supreme Court explained in Winstar Corp.,

> [t]he premise of this requirement is that the parties will have bargained with respect to any risks that are both within their contemplation and central to the substance of the contract; as Justice Traynor said, "[i]f [the risk] was foreseeable there should have been provision for it in the contract, and the absence of such a provision gives rise to the inference that the risk was assumed."

518 U.S. at 905 (quoting Lloyd v. Murphy, 153 P.2d 47, 50 (Cal. 1944)); see Seaboard Lumber, 308 F.3d at 1294-95 (adopting the Winstar Corp. formulation). 67/

Plaintiff contends that the basic assumption present in the C-23B+ contract was that the aircraft could be produced by a straightforward refurbishment/modification process,

67/ This explanation in Winstar Corp., although a case dealing with a supervening impracticability, is applicable because both a supervening and existing impracticability include this same element. Compare Restatement § 261, with id. § 266(1).

rather than by a complex remanufacturing effort, and that consideration of the type of process to be used to produce the C-23B+ aircraft was central to the parties' preaward discussions. Plaintiff reads the contract as one that, by its very terms, underappreciated the work: "In scope, type, difficulty, duration, processes, complexity, and sophistication, actual work required . . . was much more difficult, different, time consuming, extensive and expensive than work indicated by SOW/WBS." Pl.'s Br. filed Dec. 30, 2004, at 39. 68/ Thus, plaintiff implicitly attempts to align itself with Foster Wheeler, 513 F.2d at 598; Tombigbee., 420 F.2d 1037; and Natus Corp., 371 F.2d 450.

Plaintiff attempted to prove that the assumption that modification processes could be used to complete the conversion, whether it was spelled out in the contract language, is present because the contract fixed price, the ceiling limit on O&As, and the contract schedule (precluding the use of a true first article) establish that both parties shared an assumption that a modification effort would be all that was required. In addition, plaintiff places much weight on the facts that the parties negotiated the term "remanufacture" out of the scope provision of the SOW, Crawley Dep. ¶ 118, and that ATCOM approved the description of the effort as indicated in the WBS.

Obviously, plaintiff assumed that what it proposed was possible – so, too, could it be said that ATCOM assumed the same – for, as plaintiff argued, "[t]he Army, Shorts and

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68/ The WBS is not part of the contract. It set forth the work that plaintiff proposed to implement the contract terms as specified in the SOW. Consequently, it is revealing how plaintiff, throughout its pretrial brief, conflated both together when asserting that the "scope of work" grew: "Compared to the WBS, actual WPS effort shows far different work needed[;]" "Compared to the contract SOW/WBS solution[;]" "required performance was way beyond what the SOW/WBS contemplated[;]" "Commercially, job contemplated in SOW/WBS and job actually done are of two vastly different types[.]" Pl.'s Br. filed Dec. 30, 2004, at 39-40. True to form, this continued at trial. See, e.g., Mr. Bowyer of WVAC, Tr. at 2150 ("You know, I'm using the term 'WBS' and 'statement of work' kind of, kind of interchangeably, and it's quite possible that I shouldn't be doing that.").

The legal implications of conflating the two cannot be understated; growth in the scope of work from the SOW signifies that the contractor did work beyond the scope of the contract. Growth in the scope of work from the WBS, on the other hand, is attributable to the inadequacy of the contractor's proposal. Defendant argues this very proposition in its pretrial submission, describing plaintiff's argument as "[t]he [m]yth of '[e]xtra CLIN 2 [w]ork.'" Def.'s Br. filed Dec. 23, 2004, at 23.

WVAC extensively reviewed the WBS and cost proposals, separately and jointly, so that contract could reflect actual work and costs of performance plus a reasonable profit; this was the express intent of both [d]efendant and Shorts contracting personnel." Pl.'s Br. filed Dec. 30, 2004, at 38. The evidence did not show that ATCOM acted on a different assumption to plaintiff's detriment.

The mere fact that the parties discussed the means that would be required does not support an inference that the means became a "basic assumption." Moreover, the fact that ATCOM approved of the proposal also does not indicate that it adopted plaintiff's planned performance as a basic assumption. To the contrary, the contract directed plaintiff to meet a performance specification and propose a means of how to accomplish the task.

4) Fault in performance difficulties

Defendant focused its pre-trial arguments on plaintiff's failure of proof with respect to a necessary element of either the impossibility or impracticability claim: whether or not the impracticability was caused without fault of plaintiff. See Restatement § 266(1). Trial demonstrated that, indeed, plaintiff could not evade the consequences of its own actions and inactions. Evidence included admissions concerning, for example, delays in parts supply from Belfast: The letter from Mr. Nesbitt to his superior at PALS, Mr. Masterman, dated June 4, 1994, states, "Although we have no excuse on some of the critical shortages, this situation has not been hidden." As another example, Mr. Masterman wrote a June 7,1994 fax to de Havilland regarding parts supply and a slippage in de Havilland's delivery date of the first tail to WVAC: "I appreciate that there is a perception that any slip in the Programme can be blamed on shortages of parts coming from Belfast, and I do readily accept that there are currently some critical shortages that will affect the Programme if effective work arounds are not developed and implemented." However, most compelling are the erroneous assumptions about what the detail design drawings would require.

The most striking discrepancy between the detail design drawings and the WBS assumptions is the frames. The detail design drawings required replacement of several frame sections, while WVAC's technical proposal assumed that frames could be reinforced in situ. Defendant sought to prove that not only did the design engineers know prior to award that the frames would require replacement, but, ultimately, that the need to replace frame sections created the need to remove all the systems and subsystems. Defendant succeeded on both elements.

That plaintiff planned before award to replace the frames is not pivotal, because the evidence demonstrates that the decision to replace frames was made by Belfast design engineers – thus deflating the importance of the infamous Bobby Downie Document. This was not a function of plaintiff's "voyage of discovery" into the needs of a remanufacturing program. This was not caused by any "nasty surprises" – Mr. Haggerty's phrase, see, e.g., Tr. at 137, 150, 180, 360 – that plaintiff uncovered when taking apart old aircraft. This was a design drawing requiring methods planners at WVAC to plan for frame replacement. Mr. Mansfield, as the Engineering Project Manager preaward, was in a position to know, and he testified that the decision was made before award. Mansfield Dep. at 19. 69/ Whether WVAC knew of such a decision may have been a valid contention between WVAC and plaintiff, and was, in fact, the primary driver for WVAC's claim for "out of scope work" against plaintiff during spring 1994. It is relevant to show that WVAC took the position that Belfast ordered significant extra work before any discoveries on the voyage were made.

The latter point of defendant's argument – that frame replacement required all systems and subsystems removal – however, is more significant, because the more removal of the internal workings of the aircraft equates to the greater the needs of the tear down, the greater the knock-on effects, and the greater labor and time requirements. This is exactly what occurred.

Plaintiff's expert witness, Mr. Haggerty, testified in general terms that the "downside" of frame replacement was that "you [would] wind up having to take all the subsystems apart and take the airplane apart to do it." Tr. at 162. On cross-examination he confirmed:

> Q. In your view. As a methods engineer, if you were told that frames would be replaced on the donor aircraft, would you conclude from that. That all subsystems would need to be removed from the airplane before the frame replacement was done?
>
> A. Yes, a significant amount of subsystems would have to be replaced, removed. Before you could do the frames, that's correct. . . .

69/ Mr. Mansfield admitted that "[v]irtually from the start . . . we decided we would replace the top frames and top skin" – a decision made "well before contract award." Mansfield Dep. at 19.

Tr. at 213-14. Mr. Brundle, the head of Aerospace Operations at Belfast, confirmed the need to remove the subsystems once the frames were to be replaced. Tr. at 3990.

The need to replace frames created a large amount of unanticipated work at WVAC. As Mr. Bowyer wrote in a memorandum dated April 26, 1994, "[t]he Shorts schemes require a much greater extent of modification to the floor frame sectors than is included in the WVAC proposal price." WVAC threatened to file a claim against plaintiff, a claim that Mr. Nesbitt believed valid at the time. Tr. at 1171. In fact, he testified that plaintiff paid WVAC money against the claim when it acquired WVAC in 1994. Id.

When trial showed that the frames were a prime driver of much of the so-called "out of scope" work, 70/ plaintiff's witnesses attempted to downplay their significance. Overall, as Mr. McCoy testified, no one discovery created the need to remove all the systems and subsystems, and no one discovery upgraded the nature of the project from a modification effort into a remanufacturing job. He explained that "[t]he jointing of the fuselage itself would be a modification program," and when asked whether frame replacement would indicate a modification or remanufacturing effort, he responded that it, alone, would indicate a modification program. Tr. at 1899-1900. 71/ When asked the ultimate question, "[a]t what point do you get to a remanufacturing program?" he responded, as follows:

> Well, you get to a remanufacturing program when you take it all in, you know, all of the requirements of the conversion from a, an SD3-60 to a C-

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70/ As noted, plaintiff married the SOW and WBS, when the SOW required plaintiff to generate WBS that implemented each SOW requirement. See *supra* note 68.

71/ Mr. McCoy elaborated:

> [T]he frames didn't turn this into a remanufacturing job. This was always a remanufacturing job. . . .
>
> Any one of the issues that we faced on their own, if you take them in isolation, really wouldn't have made a material effect or a material impact on the program, but when you bring them all together, and there was many of them, when you bring them all together, that's really what distinguishes this from a modification job, as opposed to a remanufacturing job.

Tr. at 4039.

> 23B+. Any one element on its own would not constitute a remanufacturing program . . . .
>
> But the approach that is required to embody those modifications and the new design blended in with the old design and then to actually refurbish the aircraft, the processes, the practices, the management of it, the management of materials, all of that constitutes a remanufacturing effort.

Tr. at 1900. Plaintiff further attempted to downgrade the frame discovery at the end of trial, with a summary exhibit captioned "Calculation of Additional Impact Hours" prepared by Messrs. McCoy and Ballard during trial, which segregates the impact hours for the frames, the roof, system removal, and so forth.

This court cannot ignore the testimony of plaintiff's witnesses, including its aircraft manufacturing expert, to the effect that the decision to replace frame sections itself caused a "significant" system and subsystem removal. Tr. at 213 (Haggerty); Tr. at 3989 (Mr. Brundle: "It certainly requires a significant breakdown of the airplane."). Plaintiff's chief witness on frame removal, Mr. Cowan, agreed during his direct examination that, without the frames problem, plaintiff may not have filed this lawsuit:

> Q. . . . Mr. Cowan, you've heard discussions of other issues that arose with this B+, including the roof, joints, the corrosion we've already discussed, the over and aboves. If none of these problems had occurred, and only the frames had created problems in replacing the required subsystems from those frames, would we be here today?
>
> A. Probably not.
>
> Q. Why?
>
> A. It was 12 sectors out of 48. It's a very simple task on its own. The problem came when you combine that with the installation of a [role] beam, the installation of a third seat rail, and the installation of the revised systems, the modification or replacement of the forward roof, all of those things combined is what, in my opinion, drove the program to be a remanufacturing

> program. The joints are in there as well. All of those interacted with each other, such that it was very little of the airplane, if any, that we didn't physically go in and touch in some manner.

Tr. at 2984-85.

The frame issues arose during the first article, and it was the first discovery in a series of problems. Plaintiff's position that the totality of these discoveries led to the need to remove all systems and subsystems is overcome by the evidence that the first discovery precipitated such a need even if the totality of discoveries also led to the same result. As a consequence, plaintiff cannot prove the requisite element for commercial impracticability that its difficulties were not caused through its own fault.

Trial showed that plaintiff's ameliorative actions from the moment of the frames "discovery" to the full implementation of a production line were slow. Plaintiff's position is that it did not "productionize the facility[,]" Tr. at 3386, or complete a controlled tear down until after acquiring WVAC because it needed the benefit of completing most of the "voyage of discovery." The evidence did not sustain this position. The court finds that the frames dilemma required a re-evaluation of the project. Mr. Richmond, from Belfast's Operations Department, insisted that the C23-B+ conversion called for implementation of techniques used in a Belfast manufacturing operation – and that was before the discovery of the frames. Instead of responding accordingly, plaintiff continued down its path, believing that it could still meet the delivery schedule. It was not until plaintiff acquired WVAC in full financial crisis that plaintiff took the actions that had been necessary from early 1994 to remedy the planning inadequacies. These actions included the transfer of management responsibility from PALS to Belfast's Operations Department and the use of a controlled tear down (that occurred on aircraft 9). It was the takeover of WVAC that prompted plaintiff's reassessment, although the later controlled tear down of aircraft 9 was the precipitating event which plaintiff chose to emphasize. These actions also included the creation of the September 1995 Action Plan, which implemented what plaintiff should have implemented earlier – Mr. Richmond made those recommendations early on in the project.

By taking decisive action fundamentally to restructure the process for the C-23B+ conversion, but only over one year after the frames issue surfaced, the evidence raises the question of whether different choices by plaintiff from the outset of performance could have allowed it to meet delivery dates or otherwise reduce the overruns that it incurred. Plaintiff

cannot prove that its faulty actions did not cause the cost overruns when it cannot substantiate any reasonable basis for disregarding its obvious performance failures.

The fact that plaintiff purged the hours incurred at WVAC prior to takeover (to further plaintiff's synthesis of a reasonable damages calculation) undercuts plaintiff's proof on liability because it amounts to an admission that WVAC was responsible for cost overruns during a critical time period: the first article. Had plaintiff admitted that significant cost overruns attributable to its own lack of preparation, staff, and experience occurring at the end of its production run were its fault, discounting those hours might not affect liability. However, plaintiff admits that WVAC was not up to the work that it proposed to undertake on the aircraft intended to serve as the basis for methods planning for all subsequent aircraft. The crucial needs and decision-making occurred during the first article, and it was then that WVAC stumbled – so much so that plaintiff had to acquire the company and take over its work. With evidence that "[t]here must have been thousands of wasted manhours in this area" because WVAC had to "completely revise" its first article plan, which was already three months behind schedule, as Mr. Nesbitt's August 9, 1994 fax to Mr. Brooks states, the court cannot ignore this failure to perform. Mr. Nesbitt wrote in that same document that "[w]hat we will not pay for are in efficiencies at the air centre." Neither should the Government.

8. Superior knowledge (Count 6)

Plaintiff charges that, irrespective of any commercial impracticability, the contract should be equitably adjusted because the Government failed to disclose superior knowledge. The superior knowledge doctrine can be the predicate for a breach of contract and an equitable adjustment. Petrochem Servs., Inc. v. United States, 837 F.2d 1076 (Fed. Cir. 1988). Both require "approximately the same type of elements to be satisfied." Id. at 1078-79. For a contractor to succeed on a claim that the Government withheld superior knowledge, the evidence must establish:

> (1) [The contractor] undertook to perform without vital knowledge of a fact that affects performance costs or direction, (2) the government was aware the contractor had no knowledge of and had no reason to obtain such information, (3) any contract specification supplied misled the contractor, or did not put it on notice to inquire, and (4) the government failed to provide the relevant information.

AT&T Comms., 296 F.3d at 1312. The parties contest each element.

1) ATCOM's prior knowledge

Plaintiff argues that the Government had superior expertise with respect to the C-23B+ project because ATCOM had extensive experience (and expertise) with remanufacturing, modernization, overhaul, and major modification contracts. Mr. Haggerty, 72/ testified as to his experience with, or knowledge of, prior Army/ATCOM contracts that involved a remanufacturing effort. He described in detail the "remanufacturing" of the CH-47D Chinook helicopters.

The CH-47D program of 1975 was a contract between Boeing and ATCOM, on behalf of the Army, for the "remanufacturing" of Chinook helicopters. Mr. Haggerty was Boeing's Director of Manufacturing Operations for the CH-47D remanufacturing program. Boeing was the original manufacture of the CH-47A, CH-47B, and CH-47C models. ATCOM wanted Boeing to convert each model into an upgraded, next-in-series, Chinook helicopter, with better performance capabilities. The Chinook helicopters were returning from deployment in Vietnam.

The CH-47D program required Boeing to pre-inspect and select for induction candidate Chinook helicopters, perform an inventory, complete a tear down that involved basically a complete removal of everything from the aircraft (including all systems and subsystems). Boeing had to remove the paint, chemically clean the helicopters, inspect the helicopters for cracks by using x-rays, and create a list of repairs based on those inspections. Boeing used x-rays "to check for major areas of corrosion and fatigue cracks and crash battle damage and other damage that the aircraft that has been operating in the field for 10 or 15 years might have incurred." Tr. at 88. Several modifications were contemplated: install new instruments, take off the nose of the helicopter, rebuild the nose, put it back on the helicopter, cut two large holes in the floor of the aircraft to upgrade the cargo capabilities, overhaul the engines, and install new subsystems, new hydraulics, new wiring, and new transmissions. Then Boeing was to complete function testing of the helicopters and deliver the CH-47Ds.

72/ As noted above, Mr. Haggerty was qualified as an expert in the areas of aircraft remanufacturing, new aircraft manufacturing, engineering manufacturing processes, and aerospace estimating methodology.

According to Mr. Haggerty, the CH-47D program was an "engineering manufacturing development prototype program." Tr. at 90. When asked why the contract was structured in this manner, he testified:

> In the 1975, '76 time period it was Army and OSD policy to have engineering manufacturing development program precede a low-rate initial production program, and that LRIP program would precede a production program.
>
> So the CH-47D engineering manufacturing development/prototype program was the Army's plan to do a prototype, so we would be able to do 100 percent of the engineering; to be able to do 100 percent of the manufacturing; to understand what all of the removals were entailed; understand what kinds of problems from the field, in terms of corrosion and fatigue damage and the various configuration issues that came in; in terms of what engineering change proposals were incorporated and which ones weren't; to be able to understand basically the physical condition of the airplanes and the configuration of the airplanes; to be able to do all of the engineering one time, so that we could actually see it and make sure that all of the new parts would fit, that all of the installations would be correct; that the mechanics would agree that that was the right way to do the job because when we did it on the prototype, if they didn't like it, we were able to fix it.
>
> We were then able to correct our methods and to make them perfect, so that when we went into production, that we would have an efficient program. And we were able to test all the subsystems and, for the first time, identify all of the kinds of problems that we were going to run into, be able to document them, be able to fix the engineering to be able to fix the methods, to be able to fix the manufacturing and engineering to be able to identify any additional tools that we needed.

Tr. at 90-92.

Mr. Haggerty also explained how the prototype avoided many of the parts issues that occur in remanufacturing efforts by, for example, ascertaining the need for long-lead parts supply early on and establishing agreements with the Government through the prototype. The prototype also helped Mr. Haggerty and his team understand the magnitude of the project

in terms of the need for adequate parts storage facilities and proper parts identification systems – procedures specifically required for government property. As Mr. Haggerty explained, "You can read it in the book that says, yeah, they've got to be identified and stored, but the magnitude of this thing is something that we wanted to experience on a prototype program and were able to understand that process." Tr. at 94.

Plaintiff would impute to ATCOM the knowledge acquired from this and other programs, even in the absence of actual involvement in these other programs by the individual Army personnel working on the C-23B+ program. The court agrees, and the expertise of ATCOM with regard to major aircraft overhauls was greater than plaintiff's. However, this predicate finding does not compel a finding that the knowledge of how, or the manner in which, a particular contract program customarily is undertaken equates to superior knowledge attributable to ATCOM about the full implications of the C-23B+ project.

2) Reason to obtain this information

Plaintiff urges the view that the CH-47D program is relevant to the C-23B+ conversion because it, and the other programs discussed by Mr. Haggerty, involved remanufacturing efforts similar to the C-23B+ program. When asked what actions plaintiff would have taken had it known what Mr. Haggerty described, Mr. Nesbitt stated that "[w]e would have insisted on prototype definitely. We would have known not to accept the schedule. . . . And I honestly believe we, as a company, would not have taken on the contract." Tr. at 1099.

Mr. Brundle testified that

> I don't understand today the rationale of a different contracting approach for the Chinook [or other similar programs], . . . because in regards to both types of aircraft, they involved a significant amount of modification [and] a change in the mission of the actual aircraft. And the rationale seems to be exactly the same. I do not understand how [ATCOM] came to the determination that this contract must be a firm, fixed-price contract. And this was remanufacturing, and they had the experience of this.

Tr. at 3957.

The problems with such a position, as expressed by Messrs. Nesbitt and Brundle and confirmed by other witnesses, are two-fold. 73/ First, attention is diverted from what plaintiff did actually know, which, as described, involved everything Mr. Haggerty testified was called for by the SOW, but simply misjudged. Second, Mr. Haggerty himself ascribes more responsibility to the contractor and a contractor's ability to demand the latitude for such programs, be it a prototype, more lead time, or anything else. Mr. Haggerty testified:

> When it was apparent that the Army wanted to remanufacture helicopters, we decided that we should get the lessons learned from the work we had done in our own factory on the inspect and repair only as necessary . . . . I took my team over, and we got briefed by them on the physical facts and lessons learned and processes used to take those old helicopters in and tear them down and do the work that had to be done.

Tr. at 76. It is true that Mr. Haggerty, and Boeing, had the benefit of their own expertise. It is also true that ATCOM played a role in assisting Boeing with its investigation before Boeing submitted its proposal. As Mr. Haggerty explained,

> The Mohawk program, when our ATCOM program manager, Colonel James Hesson, realized we were going to start the program, he realized that the Mohawk program was happening down at Grumman, and he asked a team of ATCOM personnel from their program office and Boeing personnel to accompany him down to Stewart, Florida, where Grumman had a facility and was inducting Vietnam-era Mohawks and was upgrading them . . . .
>
> We were able to be briefed by the program manager of Grumman. Their manufacturing people gave us a briefing of the lessons learned and physical facts and took us through the Mohawk production line in Florida, and it was a very, very valuable lesson, and we incorporated a lot of that learning into the basic planning that we put into our proposal for the CH-47D that we submitted to ATCOM subsequently.

73/ It is also problematic in view of the relatively small production run of the C-23B+ program, which would have afforded the contractor so little opportunity to compensate for any miscalculations on pricing.

Tr. at 77-78.

Mr. Bowyer of WVAC, which was to perform the conversion, testified that "if the government had come to me and said, we want you to look at a remanufacturing project . . . , I might have shrugged my shoulders and said, well, this isn't a remanufacturing project." Tr. at 2190. However, he caveated that, "[i]f someone had come to me and said . . . we're doing the same kind of thing we expect you to do on the [C-23B+], I would have certainly said, well, yeah, let me go see." Id. Plaintiff had the business acumen to take necessary investigatory steps when agreeing to, for a fixed price, a project that it had never before undertaken.

Not only was plaintiff aware that it had never taken on a conversion program of this scale, but ATCOM itself gave plaintiff reason to make every inquiry possible. For example, the November 17, 1992 internal ATCOM memorandum, authored by Major Klein – a document faxed to Mr. Long, President of WVAC – effectively informed plaintiff of several concerns. It stated, in part:

> As a company, [WVAC] do[es] not have experience modifying an aircraft to this extent. Neither do they have experience with a production type (i.e. established tasks on repetitive aircraft). On Service Life Extension Programs (SLEP) and major modifications programs contractors (and CCAD) routinely rely on cannibalization to meet schedule. This invariably means the last aircraft in the program are delivered late. WVAC has no experience in this type of program and hence, may not be aware of this kind of typical error in managing this program.

Mr. Haggerty testified during cross-examination about this document:

> Q. Well, what does it mean to you, "established tasks on repetitive aircraft," . . . ?
>
> A. Yes, that would mean that you're doing a sequential type of – a large production order.

Q. So in other words, the Department of Defense was telling Shorts that this job is going to be different from the jobs that WVAC's ordinarily done?

A. That's correct.

Q. And it's going to be more like a manufacturing job? Isn't that what manufacturing does, repetitive tasks?

A. Yes, yes, that's correct.

Tr. at 322. Moreover, according to Mr. Haggerty, a Material Review Board procedure, which Major Klein listed as a necessity, was something required for a remanufacturing effort. Tr. at 325-26. Significantly, Major Klein described a major effort:

> They do not have a parts tracking system (software or paper) to maintain control of parts removed from an aircraft or parts due in to an aircraft. This modification program will require a significant effort in this area. They will need a tracking system and storage (e.g. cages, carts, bins) to accommodate the parts removed from an aircraft during the months that it will be disassembled, stripped, reassembled, painted, etc.

These concerns, raised well before plaintiff and WVAC had finalized their proposals, gave plaintiff every reason to make a proper investigation.

3) The Government's awareness of whether plaintiff would have no reason to obtain this information

Plaintiff presented evidence to demonstrate that the Government was aware plaintiff did not know, nor had reason to know, of the existence of what plaintiff called "physical facts." Pl.'s Br. filed Dec. 30, 2004, at 42. The evidence failed to make the case. The Federal Circuit's explication of this element in the asbestos cases is instructive.

In GAF Corp. v. United States, 932 F.2d 947 (1991), the Federal Circuit addressed whether the Government breached a duty to disclose superior knowledge of asbestos hazards.

The Federal Circuit applied its precedent in Lopez v. A.C. & S., Inc., 858 F.2d 712 (Fed. Cir. 1988), to rule to the contrary. It cited Lopez for the proposition that "the superior knowledge doctrine does not impose on a customer the duty to inform an experienced producer that its products are hazardous[,]" and stated that "the doctrine does not impose on a buyer an affirmative duty to inquire into the knowledge of an experienced seller." Id. at 949. In affirming a grant of summary judgment in favor of the Government, the Federal Circuit reasoned:

> The [trial court] found that the Government had no reason to believe that [plaintiff] lacked knowledge about asbestos hazards. [Plaintiff] was an experienced asbestos supplier. Moreover, [plaintiff] supplied its asbestos products to commercial as well as Government customers. Under those circumstances, the Government had no reason to believe that [plaintiff] needed to learn more about asbestos hazards from its customer.

Id.

Plaintiff contends that ATCOM was aware of plaintiff's deficiencies. The August 3, 1993 Business Clearance Memorandum (the "BCM") reveals that Contracting Officer Mead knew that plaintiff had never established any aircraft remanufacturing program. The BCM comments that, while WVAC had maintenance and modification experience, it lacked personnel with remanufacturing experience. For these reasons, Mr. Mead rated the C-23B+ program's technical and schedule risks as "high." Plaintiff also contends that ATCOM either realized, or should have realized based on its preaward audits, reviews, and analyses of plaintiff's and WVAC's technical and cost proposals, that both plaintiff and WVAC fundamentally had misperceived the task and that the contractors' proposals were inadequate for the effort.

ATCOM was aware from the project's inception that neither plaintiff nor WVAC had attempted this type of endeavor. For example, the April 21, 1992 Acquisition Plan indicates that a risk assessment, overall, was moderate. Technical risk was considered "moderate" because "the aircraft is a re-manufacturing of a production aircraft . . . ." Schedule risk was high because of plaintiff's "previous production history and the fact that the contractor has never engaged in a remanufacturing effort of this scale." ATCOM concluded that "[h]igh risk on production schedule is currently acceptable due to current development of planning and force structure required to support the operation of the C-23C fleet. As delivery timeframe nears, the risk should be reduced to moderate then low."

Contracting Officer Mead's comments in the August 3, 1993 BCM memorialize that ATCOM's concerns both over technical and schedule risk had not been alleviated by the time of award:

> (1) The technical risk is high because: (a) [plaintiff] has never established an aircraft remanufacturing program of any kind ([plaintiff] has always manufactured new aircraft); (b) WVAC, is financially unstable, has only been in business since Jul 91, has never done business with the Government, does not possess the range and depth of experienced personnel necessary to perform the program and thus is a high risk aspect of contract performance; and (c) a very high level of manufacturing tolerance must be maintained to separate the aircraft into four sections and reassemble it from three sections.
>
> . . . .
>
> (3) Schedule risk is judged to be high. [Plaintiff] has a poor history of on-time delivery. Because neither prime nor its subcontractor has experience scheduling a remanufacturing program of this scope, the proposed schedule is unreliable.

Although ATCOM was aware of plaintiff's and WVAC's lack of experience with this type of project, it cannot be said that ATCOM was aware that plaintiff had no knowledge of the fact of its inexperience or had no reason to obtain information regarding the type of experience required to perform successfully within the negotiated terms. The evidence was not persuasive that ATCOM should have realized that plaintiff fundamentally misunderstood the task before it. It would strain credulity for this court to find that plaintiff was not fully aware of its own prior experience and that of WVAC or the fact that neither plaintiff nor WVAC had attempted this type of conversion project. As Mr. Heaton, the Director of Programmes who assisted in obtaining the contract for plaintiff, testified, "[i]t wasn't a new aeroplane and never was." Heaton I Dep. at 34.

It also cannot be ignored that ATCOM and plaintiff drafted the SOW over a period of thirty-two months. The parties participated in a long negotiation period, discussing at length what the project required. In fact, plaintiff admits to "extensive negotiations about the amount of effort needed to design and develop the modifications for the conversion of an SD3-60 into a C-23B+[,]" including the amount of direct labor hours needed and the

"engineering effort . . . required on-site at WVAC[.]" Compl. ¶ 82. The negotiations themselves were based on the technical and cost proposals that plaintiff and WVAC submitted. Although ATCOM provided the initial draft of the SOW, plaintiff's representatives and engineers participated in its development, refinement, and finalization. Plaintiff therefore was aware that the SOW reflected, in a sense, its own understanding of the project and what would be required to obtain a C-23B+ aircraft.

4) Misleading specification or notice to inquire

Plaintiff also cannot meet its burden of proof on a superior knowledge claim with regard to the required showing that "any contract specification supplied misled the contractor, or did not put it on notice to inquire[.]" AT&T Comms., 296 F.3d at 1312. Even assuming that the contract was misleading, as plaintiff contends – in the sense that it was structured on assumptions that a prototype was not necessary, that a fixed-price was reasonable (both in total and as a fixed ceiling for the O&As), and that a complete system and subsystem tear down would not be required – plaintiff was "on notice" to inquire into what would be necessary. The evidence discussed above establishes that plaintiff had a substantial involvement in creating those specifications. Because plaintiff was on notice to inquire, it cannot obtain relief on a theory of superior knowledge. See Petrochem Servs., 837 F.2d 1076, 1079 (Fed. Cir. 1988) (stating that doctrine of superior knowledge requires that contractor was not on notice to inquire into any contract specification and that "[p]lacing a party on notice shifts the burden to that party to inquire further").

The Court of Claims explained that "the corollary of the [superior knowledge] rule is that the Government is under no duty to volunteer information in its files if the contractor can reasonably be expected to seek and obtain the facts elsewhere[.]" H.N. Bailey & Assocs. v. United States, 449 F.2d 376, 383 (Ct. Cl. 1971). Plaintiff cannot demonstrate the condition precedent for a finding that the Government withheld vital information: that plaintiff attempted to obtain information concerning programs of this nature from another source. While the court has found that ATCOM's knowledge about approaches to remanufacturing was greater than plaintiff's, that fact does not absolve plaintiff from the requirement to inquire further. Other sources of potential insight were available to plaintiff, as has been discussed above. See id. at 383 (finding that superior knowledge doctrine did not apply where information necessary for contract performance available from other sources).

A lacuna in the proofs is that the information concerning remanufacturing programs or even straightforward modification programs has not been proven to be novel or only in the possession of the Government. See Giesler v. United States, 232 F.3d 864, 876 (Fed. Cir. 2000) (stating that Government has implied duty to disclose "unavailable information regarding some novel matter affecting the contract that is vital to its performance"). Plaintiff is an experienced government aerospace contractor. Throughout various assessments, plaintiff, as well as ATCOM, attested to plaintiff's and WVAC's understanding of the task at hand. "When a sophisticated contractor's concept is adjudged technically competent and that contractor projects an air of competency with regard to what was required for performance, the Government cannot be held accountable for constructive knowledge of a lack of information about the nature of the contract." Northrop Grumman, 47 Fed. Cl. at 52. It is "reasonable for the government to assume that a contractor is the best judge of its competency and will exercise good judgment in deciding to bid on a contract." Am. Ship Bldg. Co. v. United States, 654 F.2d 75, 79 (Ct. Cl. 1981). Therefore, plaintiff, having participated in drafting the SOW, was the unique source with respect to the technical specifications of the donor aircraft, was equally conversant as ATCOM with respect to the type of aircraft to be produced, and was adjudged to be technically competent for the task not only by government audits, but by its internal assessments, cannot now hold the Government responsible for any lack of information with respect to remanufacturing or modification programs for aircraft.

"A Government contractor, regardless of its size, locality or experience, is bound to understand the complexities and consequences of its undertaking." Tony Downs Foods Co. v. United States, 530 F.2d 367, 374 (Ct. Cl. 1976). It is "reasonable for the government to assume that a contractor is the best judge of its competency and will exercise good judgment in deciding to bid on a contract." Am. Ship Bldg., 654 F.2d at 79. As an experienced aircraft manufacturer/government contractor, plaintiff should have been aware of the complexity of the SOW.

5) Performance without vital knowledge of fact that affected performance costs or duration

Plaintiff contends that it undertook performance without various "physical facts, special processes and contract approaches unique to remanufacturing[,]" of which neither it nor WVAC were aware. Pl.'s Br. filed Dec. 30, 2004, at 41. Defendant, whose argument is described more fully in its briefing on summary judgment, relies on Northrop Grumman, 47 Fed. Cl. at 52, to argue that plaintiff complains not of "facts" which it claims not to have known, but, rather, judgment as to the potential level of effort. See Def.'s Br. filed Mar. 13,

2001, at 32. In its opposition to summary judgment, plaintiff asserted that Northrop Grumman is inapposite because "[u]nlike Northr[o]p Grumman, the issue here does not involve a prediction about the level of effort required by a contractor's particular approach to a technical 'solution' of the requirements of the project" but instead a failure to disclose "factual information . . . about the very nature of the program[.]" Pl.'s Br. filed Aug. 7, 2001, at 42.

Plaintiff's counter-argument is non-responsive. The "physical facts" – by that plaintiff means items such as the location and extent of corrosion present on the aircraft – are not the facts of which plaintiff charges knowledge to ATCOM. Plaintiff charges ATCOM with knowledge of the processes of remanufacturing and their applicability to the C-23B+ project. Plaintiff made a pyramid of assumptions to propose how it would create the end-product. The manner in which the end-product would be achieved is not a fact sufficient to invoke the superior knowledge doctrine because that fact is what the contract burdened plaintiff with ascertaining. Plaintiff exercised its business judgment in estimating what it would need to do to accomplish the tasks set forth in the SOW. See Northrop Grumman, 47 Fed. Cl. at 52.

Considering all the elements of proof required to invoke the superior knowledge doctrine, the court finds that ATCOM had no independent duty to disclose past projects, whether similar or not, that may have assisted plaintiff. This was not a development contract. As Mr. Heaton explained: "[W]e were trying to produce both a lookalike and an operationally similar aeroplane, so that a crewman could step . . . into a C-23B+ from a C-23B and effectively not really know the difference." Heaton Dep. I at 34. Plaintiff assured ATCOM that it could produce and deliver the C-23B+ in the manner that plaintiff specified, and the contract contained no misleading specifications. Compare Helene Courtis Indus. v. United States, 312 F.2d 774, 778 (Ct. Cl. 1963) (holding Government to duty to disclose "vital information which it was aware the bidders needed but would not have" when a development contract contained misleading specifications), with Bethlehem Corp., 462 F.2d at 1404 (holding contractor assumed risk where Government not conducting research and development contract, but requesting bids from manufacturers for product to perform within specified limits that contractor itself assured were attainable). In these circumstances plaintiff "had full knowledge of the perils of performance and entered into the contract with its eyes open." Austin Co., 314 F.2d at 520.

Plaintiff's witnesses who were involved in the early stages of contract award and performance left the court with the impression that plaintiff's desire for this contract overcame its better judgment: It did not ask the hard questions of itself or seek information

from other sources. It was not locked into proceeding with a novice like WVAC. Plaintiff had the choice of using WVAC or not undertaking the contract. Plaintiff's awareness of WVAC's shortcomings cannot be sidestepped by placing responsibility for plaintiff's decision to proceed on ATCOM's assurances. The evidence that plaintiff relied to its detriment on ATCOM's assurances is not credible.

III. MUTUAL MISTAKE (COUNT 6)

Count 6 of the complaint pleads a mutual mistake of fact inasmuch as the C-23B+ project "was a refurbishment-modification job involving certain physical facts, processes and resources." Pl.'s Br. filed Dec. 30, 2004, at 45. Positing that this mutual mistake had a material impact on the parties' bargain, plaintiff urges reformation of the contract. In order to succeed on a claim based on mutual mistake, plaintiff must demonstrate:

> (1) [T]he parties to the contract were mistaken in their belief regarding a fact;
>
> (2) that mistaken belief constituted a basic assumption underlying the contract;
>
> (3) the mistake had a material effect on the bargain; and
>
> (4) the contract did not put the risk of the mistake on the party seeking reformation.

Dairyland Power Coop. v. United States, 16 F.3d 1197, 1202 (Fed. Cir. 1994).

"A 'mistake' that can support reformation is a belief that is not in accord with the facts." Atlas Corp. v. United States, 895 F.2d 745, 750 (Fed. Cir. 1990). "If the *existence* of a fact is not known to the contracting parties, they cannot have a belief concerning that fact; therefore, there can be no 'mistake.'" Id. The purpose of reformation is "to bring the parties' written contract in accord with their agreement." Id. Moreover, a contractor cannot prevail on a mutual mistake claim if it assumed the risk of the mistake. Flippin Materials Co. v. United States, 312 F.2d 408, 415-16 (Ct. Cl. 1963).

Because plaintiff assumed the risk that the manner in which it would perform would be erroneous, plaintiff cannot succeed on its mutual mistake claim. See Dairyland Power Coop., 16 F.3d at 1202 (affirming summary judgment in favor of Government where contractor failed to establish one element of mutual mistake claim). However, even if the analysis of assumption of risk discussed above led to a different finding, plaintiff still could

not succeed on this claim because, similar to the analysis set forth with respect to plaintiff's superior knowledge claim, the putative mistake was not about an existing fact.

"A party's prediction or judgment as to events to occur in the future, even if erroneous, is not a 'mistake' as that word is defined" under the doctrine of mutual mistake of fact. Dairlyand Power Coop., 16 F.3d at 1203 (quoting Restatement § 151 cmt. a). While both ATCOM and plaintiff participated in drafting the SOW, the negotiation process was based on plaintiff's technical and cost proposals (which incorporated WVAC's). These proposals helped to define the nature of this project based upon what the request for proposals and the SOW sought. Plaintiff had ample opportunity to assess the effort required to perform the C-23B+ project and, indeed, did estimate the amount of technology, working space, labor hours, and money required. Because the evidence showed that plaintiff apparently misjudged the effort required for the project, plaintiff cannot rely upon its own misjudgment to establish a successful mutual mistake claim.

Plaintiff's misjudgment of its estimate of the effort required under the contract is similar to the situation that arose in American Employers Insurance Co. v. United States, 812 F.2d 700 (Fed. Cir. 1987). An insurer and the Government entered into a settlement agreement concerning former employee injuries related to asbestos exposure. The insurer argued that the court should reform the settlement agreement under the doctrine of mutual mistake, claiming that "neither party contemplated the possibility that former employees would bring claims for latent occupational injuries years after final settlement." Am. Employers Ins. Co., 812 F.2d at 705. The Federal Circuit held that the insurer had made a unilateral mistake because sufficient information was not available concerning the latent occupational diseases at the time of settlement negotiations. "Appellant, as an experienced insurer, should have had the foresight to negotiate a final settlement with the possibility of these diseases in mind. In most circumstances, reformation is not available for unilateral mistake and the contractor bears the risk of its own error." Id.; see also Cheyenne-Arapaho Tribes of Indians of Okla. v. United States, 671 F.2d 1305, 1311 (Ct. Cl. 1982) (quoting Sift Chem. Co. v. Usamex Fertilizers, Inc., 490 F. Supp. 1343, 1356 (E.D. La. 1980)) ("'A unilateral mistake about a particular fact is insufficient to reform a contract otherwise properly entered into[.]'").

In this case plaintiff misjudged its estimates. Plaintiff had sufficient information during contract negotiations concerning the project so that it, as an experienced government contractor in aircraft manufacture with greater expertise concerning the technology of both the donor aircraft and the aircraft to be produced, was in a position to appreciate the scope of the undertaking. Instead, plaintiff miscalculated the amount of effort required and did not

negotiate for sufficient direct labor hours, working space, and so on. Plaintiff's misjudgment is tantamount to a unilateral mistake, as opposed to a mutual mistake by the parties, and reformation of the contract therefore cannot be granted.

IV. DEFECTIVE GOVERNMENT FURNISHED PROPERTY (COUNT 7)

This court granted summary judgment for defendant on Count 7 for defective government furnished property. That count alleged that the SD3-60 aircraft, which became government furnished property ("GFP") after the Government selected the aircraft recommended by plaintiff, "were unsuitable for their intended use as the platforms for the C-23B+ refurbishment and modification project under the Contract negotiated by the parties." Compl. ¶ 261. Plaintiff further complained that

> [t]he aircraft had far more defects and required far more effort than the Contract allowed for in terms of CLIN 0003 rectification labor and material expenses to bring them into suitable condition for the installation of the modifications. In addition, the SD3-60 aircraft required vastly more labor and materials to do the modification work to bring them up to C-23B+ standard than was provided for in the contract price.

Id.

Defendant declaimed that, pursuant to the contract's terms, plaintiff has no cause of action based upon the GFP clause because the contract obligated plaintiff to identify and acquire the aircraft. Because plaintiff selected the donor aircraft, the contractor cannot now complain with respect to the condition of the aircraft. Plaintiff's attempt in its defective GFP claim to place liability on the Government for "the selection of aircraft which [plaintiff] previously manufactured, marketed, identified in the recent market survey, inspected, and recommended for purchase, and was the subject of a maintenance program published by [plaintiff], would be the height of inequity." Def.'s Br. filed Aug. 24, 2001, at 38.

Whether or not GFP is suitable for the purpose for which it is intended is "a question of fact to be determined in each case by considering the reasonable use that can be made of the property in manufacturing the end product as required by the contract as a whole and the results obtainable from such use at a reasonable cost, effort, and expense." Preuss v. United States, 412 F.2d 1293, 1301 (Ct. Cl. 1969). In Thompson Ramo Wooldridge Inc. v. United

States, 361 F.2d 222, 233 (Ct. Cl. 1966) (alterations in original) (citations and quotations omitted), the court adopted as the test for suitability the course charted in Topkis Bros. Co. v. United States, 297 F.2d 536 (Ct. Cl. 1961):

> There, the nub of our analysis was that suitability, taken in context, does not mean merely that the end product can be manufactured . . . by using the Government-furnished property, but rather that the property can readily be used in the process of manufacturing the end product. [The GFP . . . itself must be suitable from a . . . manufacturing standpoint, taking into consideration the background of price and delivery schedules. And on rehearing the court said that suitability is an additional obligation assumed by defendant, a primary obligation, and is determined by reference to the contract as a whole[.]

Moreover, GFP "is not suitable for its intended use simply because 'by hook or by crook' the contractor can otherwise comply with the specifications – at the cost of unreasonable delay or expenditures." Thompson Ramo Wooldridge Inc., 361 F.2d at 234-35.

The Government did not supply the GFP without any investigation of the goods on the part of plaintiff. Following the procedures specified in the SOW, ATCOM identified the most desirable aircraft, approved plaintiff's pre-purchase inspection, received pre-purchase inspection reports on each aircraft, approved plaintiff's procurement of aircraft prior to purchase, and retained the right to perform a reasonable inspection or testing of the aircraft prior to acceptance to determine if the aircraft conformed to the information contained in the pre-purchase inspection report. Given the extent of that activity, it would be disingenuous for plaintiff to claim that the SD3-60 aircraft selected were "unsuitable" for the purpose intended.

Plaintiff would label as a latent defect any defect that was discovered subsequent to the pre-purchase inspection or the tear down inspection. Yet, plaintiff was required to conduct a market survey and identify, classify, and evaluate all SD3-60 aircraft. Plaintiff also initially selected the aircraft and was aware of the purpose of the aircraft for the contract. The heart of this case is that plaintiff knew that the SD3-60 aircraft were to be modified to have commonality with the C-23B aircraft already in the Army National Guard fleet. While plaintiff was aware of its responsibility for finding the "defects" in the SD3-60s in order to convert the aircraft, plaintiff also knew that any "defects" would manifest, or the modifications that would be required for the contract would occur only once the aircraft were

selected after contract award. The plaintiff knew that the contract tasked it to determine the level of effort required to modify each aircraft.

Plaintiff attempts to ignore its role in the selection of suitable aircraft by arguing that ATCOM should have been aware, from its prior remanufacturing experience, that the latent defects in the SD3-60 aircraft would vary from aircraft to aircraft, would be extensive, and would be encountered throughout the conversion process. Because it lacked remanufacturing experience, plaintiff argues that it was unaware of these alleged facts and could only report latent defects to ATCOM as it discovered them. Regardless of the type of effort that plaintiff was required to perform, however, plaintiff was aware when it signed the contract that its contractual responsibility was to determine the level of effort required for the conversion of each aircraft into a C-23B+. Plaintiff cannot hold ATCOM responsible for its failure to assess the amount of effort required or the deficiencies that would be discovered during conversion.

Plaintiff itself recognizes that much of its delay and increased costs were due to the failure of its subcontractor WVAC and that, as a result, over one year after contract award, plaintiff was called upon to apply enormous additional production engineering, human resources, operations, and material management to the C-23B+ program. Plaintiff cannot escape the fact that most of the difficulties that it experienced on this contract were not due to any "latent defects" with the SD3-60 aircraft.

V. BREACH OF DUTIES OF GOOD FAITH, FAIR DEALING, AND COOPERATION (COUNT 8)

Unlike plaintiff's theories of breach of implied duties during contract formation in Counts 1 and 2 (claims prohibited by AT&T), plaintiff sought relief in a generic Count 8 for the Government's breach of implied duties of good faith, cooperation, and fairness by taking improper actions that adversely affected plaintiff's abilities to perform under the contract. Compl. ¶¶ 279-87. This court granted, in part, defendant's motion for summary judgment as to Count 8 except insofar as the claim was based on delays in obtaining approval of O&A requests. See Summary Judgment Order, Mar. 18, 2004, at 4. Plaintiff failed to meet its burden of proof on O&A-related delay at trial, and to meet its burden in all other respects on summary judgment, for the reasons discussed below.

Every contract impliedly obligates its parties to perform their duties in good faith; and the Government is no exception. Centex Corp. v. United States, 395 F.3d 1283, 1304 (Fed.

Cir. 2005) (noting that "[t]he duty applies to the government just as it does private parties"). The covenant is a promise by each party "not to interfere with the other party's performance and not to act so as to destroy the reasonable expectations of the other party regarding the fruits of the contract." Id. at 1304. The implied duties of good faith and fair dealing "must attach to a specific substantive obligation, mutually assented to by the parties." Alaska v. United States, 35 Fed. Cl. 685, 704 (1996), aff'd, 119 F.3d 16 (Fed. Cir. 1997) (Table). Thus, the implied duties of good faith and fair dealing "do[] not form the basis for wholly new contract terms, particularly terms which would be inconsistent with the express terms of the agreement." Jarvis v. United States, 43 Fed. Cl. 529, 534 (1999).

In order to prove a claim based on the Government's breach of its implied obligation of good faith and fair dealing, the contractor must rebut a "presumption of regularity . . . that public officers perform their duties correctly, fairly, in good faith and in accordance with law and governing regulations[.]" Schism v. United States, 316 F.3d 1259, 1302 (Fed. Cir. 2002). The presumption of good faith "is valid and binding unless 'well-nigh irrefragable proof rebuts or overcomes it.'" Id. (quoting Alaska Airlines, Inc. v. Johnson, 8 F.3d 791, 795 (Fed. Cir. 1993)); Torncello v. United States, 681 F.2d 756, 770 (Ct. Cl. 1982) (stating that "the government, unlike private parties, is assumed always to act in good faith, subject only to an extremely difficult showing by the plaintiff to the contrary"). Plaintiff's burden is "intended to be very difficult," requiring clear and convincing proof that the Government specifically intended to injure plaintiff. Am-Pro Protective Agency, Inc. v. United States, 281 F.3d 1234, 1240 (Fed. Cir. 2002). For example, "'[s]ubterfuges and evasions violate the obligation of good faith.'" Malone v. United States, 849 F.2d 1441, 1445 (Fed. Cir. 1988) (quoting Restatement § 205 cmt. d).

The aspect of the covenant of good faith and fair dealing that calls for non-interference is sometimes referred to as a duty to cooperate. Compare Centex Corp., 395 F.3d at 1304 (stating that the covenant of good faith and fair dealing "imposes obligations . . . that include the duty not to interfere with the other party's performance"), with, e.g., Olympus Corp. v. United States, 98 F.3d 1314, 1318 (Fed. Cir. 1996) ("[I]nterference by the government with a contractor's access to the work site may constitute a breach of the government's duty to cooperate"). A breach of the duty to cooperate is actually a breach of the covenant of good faith and fair dealing. See Malone, 849 F.2d at 1445 (citing Restatement § 241(e) for proposition that "lack of diligence and interference with or failure to cooperate in the other party's performance" violates obligation of good faith). Failure to cooperate can give rise to a claim for breach of contract, see Malone, 849 F.2d at 1445-46, but such a claim must be discussed in the particular circumstances of the case, see Milmark Servs., Inc. v. United States, 731 F.2d 855, 859-60 (Fed. Cir. 1984).

In terms of "hindering performance," the implied duty not to hinder performance prohibits the Government, as with any other party to a contract, from "do[ing] anything to prevent performance thereof by the [contractor] or that will hinder or delay him in its performance." Lewis-Nicholson, Inc. v. United States, 550 F.2d 26, 32 (Ct. Cl. 1977). "Not only must the Government not breach this implied provision, the Government "must do whatever is necessary to enable the contractor to perform." Id. at 32. Thus, the Government can violate the duty to cooperate by causing a delay in the contractor's performance. Id.

Plaintiff's testimony and documentary evidence were weak. Plaintiff could not meet its burden at trial with respect to the Government's alleged failure to timely reply to O&A requests. While plaintiff complained that approvals took an undue amount of time, the evidence showed a typical turnaround of several days. Plaintiff did not prove that, in the circumstances, this delay was excessive.

As to the miscellany of allegations in Count 8 of plaintiff's complaint, this court ruled on summary judgment in favor of defendant because plaintiff failed to demonstrate, under the legal standards applied to the facts presented at summary judgment, that the Government conduct was sufficiently offensive to warrant a finding of breach of contract. Similarly, at trial, with respect to Count 8's claim for O&A delays, plaintiff also failed to put forth sufficient evidence, or elicit compelling testimony, that sufficed to meet its burden.

VI. UNJUST ENRICHMENT (COUNT 9)

This court also granted defendant's summary judgment motion with respect to plaintiff's claim for unjust enrichment. Plaintiff pleaded that it has not been paid for the full value of the goods provided and services rendered to the Government when it performed rectifications and modifications to twenty-eight used SD3-60 commercial aircraft in order to obtain twenty-eight like-new C-23B+ military aircraft. Compl. ¶ 290. Plaintiff asserted that the parties intended for the contractor to recover the value of the aircraft as delivered (measured by cost), not that plaintiff provide goods and services without full reimbursement of reasonable costs. Id. ¶ 291.

While defendant correctly argued in its motion for summary judgment that this court has no jurisdiction to entertain claims for unjust enrichment for contracts implied-in-law, Aetna Cas. & Sur. Co. v. United States, 655 F.2d 1047, 1059-60 (Ct. Cl. 1981); Putnam Mills Corp. v. United States, 479 F.2d 1334, 1338 n.3 (Ct. Cl. 1973); Algonac Mfg. Co. v. United States, 428 F.2d 1241, 1256 (Ct. Cl. 1970), plaintiff argued, rather, that the contract was

implied-in-fact by virtue of the alleged illegal price term, as alleged in Counts 1 and 2 of its complaint. Plaintiff could not sustain its argument on summary judgment because its claim for unjust enrichment involves the same subject matter as is covered by an express written contract. "[A]n implied-in-fact contract cannot exist if an express contract already covers the same subject matter." Trauma Serv. Group v. United States, 104 F.3d 1321, 1326 (Fed. Cir. 1997). Consequently, because an express contract exists between plaintiff and ATCOM, plaintiff could not recover under the equitable theory of unjust enrichment, and this court entered judgment in favor of defendant as to Count 9.

CONCLUSION

Based on the foregoing, it is found and concluded that plaintiff has not established liability for any of the claims advanced in its complaint. The Clerk of the Court shall enter judgment for defendant.

IT IS SO ORDERED.

No costs.

/s Christine O.C. Miller

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Christine Odell Cook Miller

Judge